BLACK BOOK OF ARSON

by
Lyle Whitney

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Introduction

The Employment of Fire as a Weapon

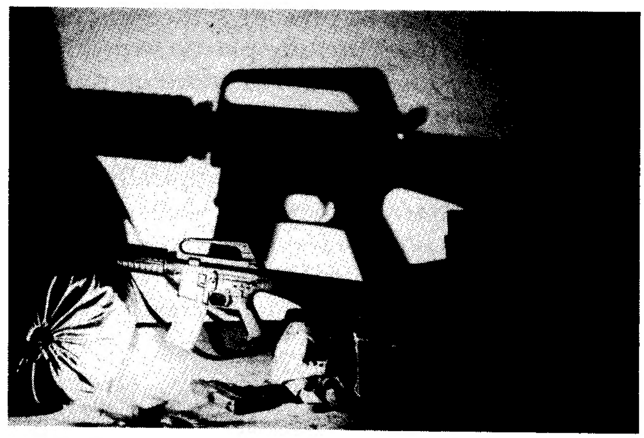
Fire has often been compared to a living creature: it eats, it breathes oxygen, it reproduces itself, it behaves in ways and according to certain rules that could be considered a thought process, it fights for life, and if deprived of its essential needs, it dies. Living or not, it is a ferocious beast of tremendous power.

Fire is often controlled and made to serve man, so either it or the ability to give birth to it are almost always near at hand. Those who know the beast and how it works carry with them a powerful device, that can be sent to destroy an enemy's ability to wage aggressive war. The beast does this by consuming the enemy's stores and destroying his devices, and also by killing him.

Fire has been used as a weapon of war from the stone age to the present, and it will continue to be used as such long into the future. It is a powerful weapon produced by war industries, and also by people who don't have access to factory-made weapons; since it is made from the environment, it is easy to carry a large supply of it. So it is a good weapon for use behind enemy lines. It is usually at hand as an improvised weapon, even when nothing else is available.

Factory-made incendiary weapons are likewise very destructive and efficient. At the beginning of the Second World War it was believed by the allies that explosive bombs were more destructive than incendiary bombs. But by the end of the war the allies had learned that pound for pound, incendiary weapons were several times more destructive than explosive bombs.

Fire is such a powerful and easy-to-activate weapon that even children routinely kill with it, without even trying. It can rage out of control so quickly or be so sneaky that even more or less competent adults often unleash its power by accident. Those able to control this demon are at once safer and deadlier with it. This means that if you master it you have a terrible weapon at your command, and you are better able to defend yourself from someone who tries to use that same weapon against you. And because you know fire, you are less likely to be a victim of an accidental one.



A candle-flame casts a giant shadow in a dark room. Likewise, a small fire can grow giant and lethal quickly, if the conditions are right.

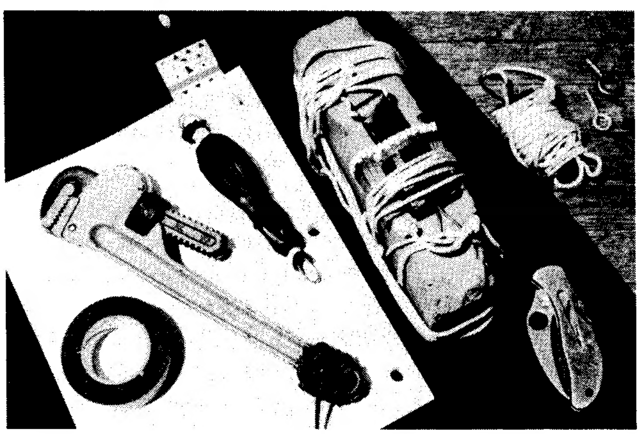
Given the right conditions, fire can grow into a huge monster in a matter of seconds or an explosion in even less time, though a fire usually takes several minutes or so to develop, and longer to move through a building. Long before the flames of a fire reach its victims the beast sends out invisible assassins; these are poison gasses,

that often kill before their victims even know there is a fire, carried upward and outward by the heated air and arriving ahead of the smoke. Inside an enclosure that inhibits the upward and outward movement of air, these assassins grow thick and kill silently.

The guard against these assassins is the smoke detector. In order for the assassins to be truly invisible, all in the area have to be disabled.

Different fuels produce different gasses; the one that causes the most deaths is carbon monoxide, which is produced by incomplete combustion due to insufficient oxygen (a very common condition in building fires). This gas cannot be seen or smelled; the one being killed by it probably doesn't know he's being poisoned. More exotic poisons can also be present, if the right fuels are used. These fuels include plastic, wool, silk, and rubber, among others. For more on poison gas and fuel, see Chapter 2.

This first line of killers is followed by a second line, known as smoke. This is typically a mixture of tiny unburned particles, globs of resin, various gasses, and condensed vapors, sometimes including steam, that have boiled out of the fuel. The less oxygen the fire has the more smoke



This portable fuel-air bomb kit uses fuel supplied to the target by local infrastructure. The rigging material allows ignition to be activated by a timer or boobytrap (or both). The weight that activates the igniter can usually be supplied onsite, or you can use the pipe wrench, if you don't want to carry it out. The pipe wrench is useful for more than just opening gas lines though; it is carried with its jaws shut tight for the smallest possible size and a solid package that doesn't rattle.

it will produce, and the more flammable the smoke will be.

Like the gasses that precede it, smoke is carried upward by heat, until it cools, where it simply hangs around and moves wherever the currents carry it. Unlike gasses though smoke is not invisible; it is so visible in fact that it obscures vision, often very suddenly, and to the point that even artificial light cannot keep it from blinding those it surrounds. Then, after making its victims blind and helpless, the smoke kills them, by filling their lungs and depriving them of oxygen.

Most people killed in building fires are killed by lack of oxygen, poison gas, or smoke. But when those things fail to kill, the intense heat that follows finishes the job, either directly, or by causing the building to collapse, unless the people escape or the fire is interrupted. People killed directly by heat are usually killed by inhalation of flame or hot air rather than by decomposition of the body, which usually occurs after they are dead.

Besides killing an enemy, fire can also reduce his ability to wage war, by destroying his war-making devices. Burning stockpiles of weapons and ammunition, the vehicles that carry them, the factories that make them, and the infrastructure that supports it all is a common practice in war. In these cases the primary weapons are heat and flame, with smoke and poison gas serving primarily to hinder fire-fighting efforts.

Fire is also used to destroy an enemy's ability to survive, so that he either stops fighting and concentrates all of his efforts on survival, or he dies; either way, he leaves you alone, at least for awhile (unless he decides to come and take your stuff since you burned his). This use of fire includes the burning of crops and food supplies, shelter, and the infrastructure that supports a society, such as power and communication lines and equipment, gas and water handling facilities, any and all control centers, and so on. Ultimately anything on the enemy's ground is most likely something that serves him in some way and so is a valid target; the question to ask is what are the best targets.

This same thing is often done on a tactical level. Any time you start a fire on the enemy's territory, he has to devote some or all of his attention to putting it out, or it will be very destructive and might kill him or his people. While he is fighting the fire (or escaping from it), you are

moving into position or escaping from him. This is usually referred to as using fire as a distraction.

Fire is also used to render an enemy unable to make war by burning bridges, vehicles, and other transportation devices used to carry war from one point to another. This rarely stops an enemy for good, but it can provide time, to prepare other means to do so.

In this and other ways fire can aid escape. Taken to an extreme, this becomes a scorched-earth retreat, where retreating people destroy everything they can't carry, to deny it to their enemy. This makes the ground uninhabitable to the enemy, to encourage him to go home. And if he does not, (or even if he does), the scorched earth he inhabits leaves him more vulnerable to counter-attack.

The downside to scorched-earth of course is that you burn up all your own stuff. It's easy to understand communists scorching the earth, but it's far less likely that capitalists would ever do it. Often it's better to stand and fight.

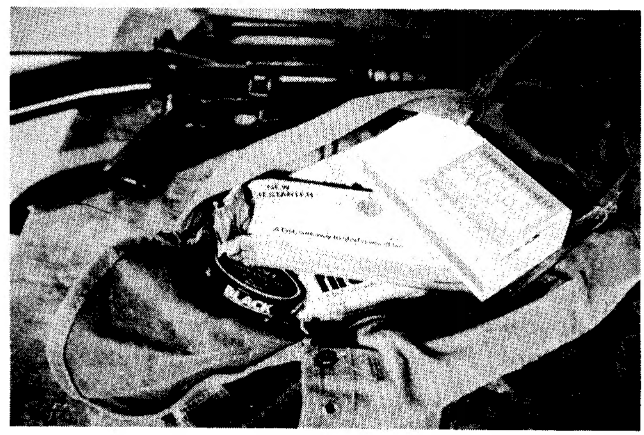
Fire can be a strong psychological deterrent to continuation of a fight, because it is among the most feared of all death and injury mechanisms. The attack with fire bombs against the civilian target of Dresden, Germany, by the Allies in World War II, is a classic example of fire used for psychological effect (some say revenge was also a factor). The massacre by fire at Waco is an example of a rogue government waging psychological war against its own people; whether or not the fire was accidental, the message sent was that when the government comes for your guns you had better give them up, or horrible things will happen to you and your loved ones.

The worst place anyone can imagine is Hell, and Hell is a place characterized by fire. Burns are among the most painful and hideous of all injuries; survivors of fires serve as a constant reminder of how terrible a weapon fire is, and so what a terrible thing war is. This is a common strategy of psychological warfare.

Usually fire used as a weapon does a combination of the above things. A fire in an enemy weapons factory, for example, destroys their weapons and their ability to make them; it also kills the people who make the weapons, so that they can't make them any more even if the factory is rebuilt. And it makes other people afraid to work in such facilities; many will figure out that if they stopped producing war machines they wouldn't be getting burned.

The result of such a combination is often that the factors multiply each others' effects, so that the combined effect is greater than the sum of effects. The same thing is often true as well on a tactical level, with various intoxicating, toxic, and lethal gasses combining forces with smoke and heat to render a victim helpless and then kill him.

An advantage of fire is that since it sometimes occurs accidentally, a deliberate fire can be made to appear accidental. This can be very useful to a saboteur working in enemy-controlled territory.



A lot of firepower can be carried in a small container. To get the most out of it, treat every fire you set like a single bullet (even though it isn't); aim for the enemy's vital organs.

THE ADVICE OF SUN TZU

The Art of War, the oldest known book on the conduct of war, written over two thousand years ago by an author called Sun Tzu, is to this day still considered to be among the most pragmatic books on the conduct of war. The book should be studied by all martial artists.

This is what the author says in the chapter "Attack by Fire," from a translation by Samuel B. Griffith:

"There are five methods of attacking with fire. The first is to burn personnel; the second, to burn stores; the third, to burn equipment; the fourth, to burn arsenals; and the fifth, to use incendiary missiles.

Equipment for setting fires must always be at hand.

There are suitable times and appropriate days on which to raise fires.

Times means when the weather is scorching hot; day means when the moon is in Sagittarius, Alpharatz, I, or Chen constellations, for these are days of rising winds.

Now in fire attacks one must respond to the changing situation.

When fire breaks out in the enemy's camp immediately co-ordinate your action from without. But if his troops remain calm bide your time and do not attack.

When the fire reaches its height, follow up if you can. If you cannot do so, wait.

If you can raise fires outside the enemy's camp, it is not necessary to wait until they are started inside. Set fires at suitable times.

When fires are raised upwind do not attack from downwind.

When the wind blows during the day it will die down at night.

Now the army must know the five different fire-attack situations and be constantly vigilant.

Those who use fire to assist their attacks are intelligent; those who use inundations are powerful.

Water can isolate an enemy but cannot destroy his supplies or equipment."

LIMITATIONS

The main drawback to the use of fire as a weapon is that it is not usually very precise. It isn't at all like a scalpel; it's like a bomb, but even less predictable and harder to control. You can use a gun inside your home, but you aren't likely to want to use a molotov cocktail there, because you don't want to burn your house down, especially if your loved ones are in it. You don't want to set fire to any building that you're inside of, unless you have a good escape plan. You don't want to burn down your neighbor's house either.

But if there are people outside shooting at your house, it could be a good response for you to fire-bomb their positions and vehicles, as long as you could be sure the fires you started didn't come back to you or your neighbors. Chances are they'll be using molotov cocktails against you whether you use them or not. Any flammable liquids inside the house might as well be doing some good outside instead of being inside where they are a fire hazard.

There are many times and places where it doesn't matter how good a weapon fire is, you can't use it. Other times are questionable, and it's a matter of balancing one risk against another. This is a problem with incendiary weapons.

YOUR RESPONSIBILITY

The devices described in this book are extremely dangerous, to the intended target, the person who uses them, and anyone else who accidentally gets in the way of the fire they produce. They are intended for only the most desperate situations. They should be treated with the utmost respect and care when they are used. Remember that people who do stupid things with firearms sometimes shoot themselves in the foot and kill people accidentally, including themselves. Don't shoot yourself in the foot with fire.

The formulas and devices in this book come from a variety of sources; some from my own experimenting, some from military manuals, other books, and interviews. This book is best used as part of a body of instructional material, which includes the reference books listed in the bibliography, and also books on chemistry, electricity, construction, and so on, as well as manuals on any manufactured device you use.

School courses on those subjects and professional and semi-professional (i.e., do-it-yourself) experience are better than books alone for learning how to make things. Experience at things like being a volunteer or professional fire-fighter, gas company mechanic or inspector, electrician, chemist, soldier, and so on can all be very useful.

This book, in other words, like many other books, is filled with very useful information, but it's up to you to make your devices work. The same goes for safety.

THE ETHICAL USE OF INCENDIARY WEAPONS

In most ways fire is like any other weapon. All weapons kill, and killing is a terrible thing. The right and wrong of using fire as a weapon is essentially the same as it is for all other weapons, but there are certain things that are somewhat specific to fire, most prominent among them being that fire is among the most difficult of all weapons to control; it can grow quickly and unexpectedly, into a terrible demon and wanton

destroyer, of lives and property, the latter often being essential to survival.

It has been agreed to (at least superficially) by all civilized people that use of the power to kill people and destroy property is ethical only when it is done in defense. What so-called civilized people don't always agree on is exactly what constitutes defense. In most cases there really is one side that is the aggressor and another side that is the defender, but both sides always claim to be defending themselves, or someone or something sacred.

People and nations often lie to themselves and others, and they are often very good at it. Sometimes both sides are aggressors, but both sides are never defenders. And when one side commits an aggressive act, there is a question over whether a given response is defense or aggression, as in revenge. But good men can usually answer such questions, and there is indeed such a thing as right and wrong.

To be ethical in your use of fire, be sure first of all that you are acting in defense, and not lying to yourself about it. This seems simple enough, but there are some gray areas that make it a little more complicated.

One big gray area is at what point a potential enemy becomes a serious enough threat that attacking him becomes an ethical act. Is there a point where initiating violence, hitting him before he hits you, is the right thing to do? Is it ever all right for you to be the aggressor, in order to stop someone that you know will commit an act of aggression against you or your country?

Before the Nazis had actually made war on anyone, their build-up of arms made it clear that they were almost certainly planning to make war, and if that build-up didn't clue their neighbors in the tactics and rhetoric of the Nazis should have. An early strike against them could have saved many lives. The same is true of the communists after the nazis were defeated.

At what point such a strike would have been ethical is a question that requires great judgment. History tells us that the political leaders of the free world at the time showed poor judgment, and their poor judgment allowed a war and holocaust to occur on a scale unprecedented in human history, followed by slavery for much of the world, and a long, destructive cold war.

So what does all this mean to you? If somebody threatens to kill you, and you have good reason to believe that he will make a serious attempt to do so, are you justified in setting his house on fire while he is in it? If the answer is no because of his neighbors, how about a pile of smoldering rags in his basement to poison him while he sleeps?

I'd say it would be very hard to convince a judge and jury that such an act was justified; given the right conditions it might be done, but it isn't likely. It isn't always clear who is the aggressor when a threat takes place over a period of time. The liberal press, bureaucrats, and police try to force you to rely on government for protection, but when government fails, which it often does, it's no big thing to them (they might feel bad though), but it's a real big thing to you and your loved ones. So is there a point where you would be ethically if not legally justified in making a preemptive strike?

As far as I'm concerned, the answer is yes, given the right conditions, but such conditions exist only very rarely: there is a big question over how definite and immediate the threat would have to be. This is a big gray area because all situations are different. Decisions need to be based in sound judgment.

And always remember that even if sound judgment determines that you are justified in taking the initiative, the law might not agree with you, which means that if you get caught defending yourself in this manner you could very well go to prison, or worse. Judges and juries can't always be counted on to do the right thing. A threat would have to be pretty immediate to make starting a fire legally justified, and then only if the fire didn't spread to innocent people.

As an example, say somebody is in an isolated house on a hill with a rifle looking for you, intent on killing you. You are hiding in an outbuilding; all you can find to defend yourself with are a cigarette lighter, a few breakable bottles, some rags, and some liquid fuel. You might be legally justified in making an incendiary attack on the guy with the rifle, if you couldn't get away without getting shot and if there is no other way to stop the guy, and if you don't start a forest fire. That's a lot of ifs.

If a threat is not serious and immediate enough to risk getting burned and going to prison, chances are it isn't serious or immediate

enough to use an incendiary weapon. Even in cases where use of a firearm would be justified you might not be justified in using fire.

Some people say that the fire-bombing of Dresden Germany in World War II was not a legitimate act of war but was instead an act of revenge, because Dresden was a civilian target, filled with refugees from the Eastern Front. Others say that bringing the horror of war to the enemy's homeland though is a good way to make him stop fighting, meaning that even an act of pure terrorism might be a legitimate act of war. So who's right? If the Nazis hadn't started the war in the first place Dresden wouldn't have burned, but the citizens and refugees of Dresden didn't start the war, and there is a question over whether burning them did anything to end it.

Usually right and wrong in war comes down to a matter of survival: If someone tries to kill you, you are justified in doing whatever it takes to stop him. The one who initiates mortal combat is the one responsible for the outcome, as long as the defender does not do any more than what is necessary to stop the aggressor. In mortal combat, ruthlessness is a virtue. It is the reason for the act that makes the difference, not how ruthless or violent the act might be. Back-stabbing is the rule in war.

The perception of right and wrong often depends on who wins, because they write the history books. But not always. For example, America won the cold war, but communists are writing what passes for news, and news is one of the things history books are made of. Right is right though in any case, regardless of the perception.

These are the kinds of problems you will encounter when deciding whether or not and how to employ any deadly weapon. When that weapon is a horrible beast that can rage out of control, killing large numbers of people and destroying much property, there are even more ethical problems. It's one thing to put a bullet in your enemy's heart, but if you burn down his house your fire might also kill his family and his neighbors. Likewise, it would be grossly unethical to burn down an apartment full of innocent people to kill one or a few occupants.

Governments often make the decision though to use weapons that they know will kill innocent people and destroy their property; this death and destruction is often called collateral damage. And governments are nothing but powerful people exercising judgment based on a body of law. In theory they are good and wise people exercising good judgment, but that is not always the case.

It's reasonable to assume that at least some of the people living in Dresden were not sympathetic to the nazis (especially since so many of them had become refugees because of the Nazis' stupid war), and the people who ordered the fire-bombing of the city had to have taken this into account. But in war a great many innocent people die. If many lives can be saved by killing an enemy in such a way that a relatively few innocent lives are lost, it is often considered a fair trade. But it is not always clear whether that is the motive, nor if it has that effect.

This is the type of decision that military and political leaders have to make sometimes. It requires great judgment, which all too often is lacking.

If you master the use of fire, you too will be in a position where you can make that kind of decision, and the best advice I can give you is that you had better use good judgment, because you will have to answer for your act, if not before a human judge then before a Higher One, and though you might be good at lying to yourself and those around you (as many of us are), it's hard to lie to a judge, and you can't lie to God. So you had better make sure that you are not lying to yourself and that your purpose and judgment are good. Otherwise, you too might feel the pain of fire, for eternity.

While on the subject of Hell, another characteristic of fire is that it is a very horrific weapon, causing agonizing deaths and grotesque injuries. Few weapons are feared and reviled as much as fire. People who try to limit weapons in war often try to limit the use of incendiary weapons, saying that they cause suffering beyond what would be necessary to accomplish an objective (i.e., kill an enemy, etc.) by other means, and so use of them amounts to inflicting suffering for its own sake.

This of course is nonsense, and the peaceniks have been largely unsuccessful in this regard. Fire is one of the oldest weapons of war and it will always be a part of war. Improvised fire will always be a weapon that is available to virtually anyone. And a weapon that is horrific is a good thing in war, because scaring the Hell out of your

enemy is a good thing to do. Fire always has been and always will be a useful weapon, and all the peaceniks could ever do is keep it away from the good guys.

Often attempts to limit such things as incendiary weapons are in reality subversive attempts to inhibit one side's ability to fight. During the Vietnam war, for example, much atrocity propaganda was engaged in by American traitors regarding the use of napalm. Since the enemy used children as shielding children sometimes got burned. The communist force was literally a massive, state-sponsored terror and death squad. But it was America that was portrayed in the liberal press as the savage killer of children.

All weapons are terrible, and the more powerful they are the more terrible they are. Fire is especially terrible as a weapon, and it is a very hard weapon to control. As with all weapons, the one who sets it is responsible for everything it causes. So if you use it, do so carefully and wisely, always keeping in mind the potential consequences of your act.

The information in this book is intended for situations where there is no law to protect you, where someone else has forced you into mortal combat, and you have no reasonable alternative. Even then, you are responsible for all of the death, injury, and loss from the fire if you are the one who starts it. Even to save your own life, it is not ethical to kill innocent people. Only in extreme cases is it ethical to set a fire that you can not stop from killing innocent people.

What all this means is that the weapon that you acquire by studying this book is one that you should hope never to use. It is a good thing for good people to command powerful weapons; the authors of the United States Constitution knew this, and so included in the document the right of the people to have weapons. The better armed free people are, the more likely they are to remain free. So by all means acquire the weapon by acquiring knowledge, but use it only when there is no reasonable alternative, and its use is justified.

SAFETY

Outside of mortal combat, people who are not fools do everything in their power to avoid setting fires that ruin things and kill people. So for a person who is not a fool, this is a book on fire safety. By showing you how fires start and spread, this book shows you how to reduce the risk of accidental fire in your own life: just as I was able to turn around the instructions in books on fire safety, you can and will just as easily turn around this book on killing and destroying with fire, and keep yourself from ever being a fool with it.

If you have to start a fire to defend your life or your country do the best job you can of it, but until then use these instructions to keep yourself from being a fool or a victim. And if you do ever have to use the weapon, safety becomes exponentially more important.

In making your devices, and in testing and experimenting, make sure there is nothing that can burn out of control in the area. Good housekeeping is essential. Know what you are doing, and have your mind on your work. There is little that would make a liberal bigot happier than to read about some patriot burning himself and his house while playing with fire. Don't make those bigots happy.

A certain amount of experimenting is essential to mastery of the art of fire-making. You should not do any experimenting though unless you are a competent adult who has not been drinking. Study books like this and others, and master the technique of arson, as a member of the freedom militia, which includes all American patriots and freedom-fighters worldwide. Do your experiments in a controlled, safe manner.

If you are a minor you are not of a responsible age to do any unsupervised experimenting with fire. Go to chemistry and other science classes in school and join the Boy Scouts if you want to learn how to build good fires.

Mixing chemicals can be extremely dangerous. Know beforehand what to expect when you mix them. If you have no experience with them, mix a very small amount at first to see how they react. Remember that a reaction can be immediate or delayed. Study books on chemistry.

Many fuels produce fumes that are toxic, flammable, and explosive. Make sure there is adequate ventilation wherever you mix them; outside is usually best, but even outside, fumes can build up if the air is still, and natural air flow might carry them into a building or other confined space.

If you have to be inside when you mix fuel and fill bottles it is best to have two or more windows open on opposite sides of the house and interior doors between them open, so that air can

Burn your enemy, not yourself. Any time you do any experimenting or make an incendiary device, use appropriate safety equipment. A good fire extinguisher and safety glasses are among the most important. A face shield is sometimes a good idea, and welding gloves can be very useful in putting out small fires.

flow through the room. It is important that fumes be carried outside, not just to another part of the building where they might build up and ignite.

If there is no natural draft or it is insufficient, a fan should usually be set at the window furthest from the fumes, blowing over the work area and causing a draft carrying the fumes out through the other window. If there is a natural air-flow through the windows, use the fan with it instead of against it. Do not set a fan to suck air out or its spark might ignite fumes.

Don't have flammable materials close to igniters, in work areas or in storage. Igniters are anything that can ignite fuel, from things you make to pilot lights. Carry and store your own igniters as far away from fuel as is practical. When you have open containers of volatile fuels especially, remember that many buildings have pilot lights for hot water, heating, cooking, and other things; motors, switches, and other electrical devices produce sparks; in dry air, movement and contact with anything can produce a spark; any of these can ignite fumes, if the air/fuel mix is right at the point of ignition. Smoking should obviously be avoided.

When working with flammable liquids, remember that most fumes are heavier than air, and so fall downward and float along the floor, which is where many pilot lights are located. These fumes can burn and explode.

Always have the means to put out any fire you might accidentally start; this means a fire extinguisher, buckets of sand, water, fire blankets, or whatever it will take. And don't let having a fire extinguisher give you a false sense of security.

Leather gloves, especially welding gloves, can be useful in putting out small fires. Leather coats and other leather clothing can also help protect you from fire.

Make sure any fire you start gets put completely out. Things that someone thought were extinguished and threw away (i.e., cigarettes) have started many fires. Even if something feels cool to the touch it might still be burning on the inside.

Many accidents are a result of two or more things being done that were each only half wrong. For example, one person leaves a vial of volatile fuel in an unsafe place and someone else isn't watching where he's going and knocks it off, a third person turns on a light, making a spark, a fourth idiot backs him up by lighting a cigarette at the same time, and they all burn. In other words, don't even do things that are half wrong when working with fire and its components.

Wear eye protection when working with anything dangerous. This includes everything from Molotov cocktails that might leak to fuel that might flare up unexpectedly, as well as concentrated acids and other things that can damage your eyes or blind you. The eye protection should provide more than token protection: face shields, goggles, or both should be worn in many cases. A patriot needs good eyes, so take care of yours.

When working with acid or other caustic chemicals, in addition to eye protection, wear

rubber gloves and heavy aprons. Have a water hose or other means to quickly and thoroughly wash off any acid you get on yourself.

The most important safety rule of all is, know that you are responsible for the consequences of your own acts, and act accordingly.

THE PURPOSE OF THIS BOOK

The purpose of this manual is to provide readers with information that might be useful if the American people ever need to defend themselves. For example, if the free world were overrun by enemies of freedom, and it became the duty of the people to fight that enemy, fire would be one among many weapons, and a very powerful one. Any time a person has to fight to survive, fire might be his ally. It might also be his enemy. Either way, it is a good idea to know the subject.

It has been a long time since the American militia has had to fight on its own ground, and hopefully it never will again. But if it ever does, it will be good that books like this were distributed and studied. Such a time is always possible; whatever the future holds, armed people are more likely to remain alive and free.

A short time back a group of traitors levied war against the United States Constitution, by outlawing a class of firearms based on their status as arms, with that status measured by, among other things, firepower. As is always the case with illegal gun control laws, this treason was sold to American citizens by a big lie campaign, reminiscent of the big lie campaigns of the communists and the Nazis. And this big lie was just one in a series, all oriented toward the same end.

This book is about real firepower, the essential mechanisms of which are all legal and unrestricted. Read on and see what a terrible weapon these traitors allow children and psychopaths easy access to, as they corrupt and destroy the Constitution in a phony attempt to render people less able to commit mass killings.

These corrupters have this as their motto: "Ye shall know untruth, and it shall make you unfree." They have much power, and they have seen some success; they will likely see more. It is possible that a point will come when patriots are forced to choose between surrendering their freedom to traitors or using their arms in defense of it.

It was the will of the founders of this nation and it is still their Law that American citizens

A black gun and two black incendiary devices. A can of shoe polish and cigarette lighter can be more deadly than a so-called assault weapon in the hands of someone who knows how to use fire. The Bic lighter is very similar to the Glock pistol: A plastic handle full of firepower connected to a steel firing mechanism, activated by a mechanical, double-action trigger. Both are powerful weapons, but the incendiary has the capacity for a far greater death toll.

have the right to be armed. As long as there is a group of traitors dug in deep in government and the press, allied together in a ruthless campaign to destroy the written Law, it is the duty of all who support the Law to arm themselves to the best of their ability, and organize for defense of the nation. One means toward that end is to study this book, and master the weapon of fire.

Neither this nor any other weapon should ever be used in an aggressive manner. The Law is the patriotís friend; he should obey it, and expect others to do so as well. This includes especially those who hold political, judicial, and police power. Since freedom is the Law, there is freedom when all obey and uphold the Law.

A time to fight has not yet come, and hopefully one never will. But in case one does, master the weapon described in this book, and others. Then teach and organize your friends and neighbors.

A NOTE ON WRITING STYLE

In this book the word fireman will occasionally be used to refer to a man who studies and uses fire as a weapon, just as the word rifleman refers to a man who uses that weapon. There will be no problem of confusion between this and

The fire in this device has just barely begun; it will grow much bigger (as fires tend to do), and burn for a long time. Out of the can it melts, flows, and sticks like napalm. Ignition can come from various sources. Such devices are common.

what men who fight fires used to be called; long ago the liberal guardians of thought banned the word fireman, declaring its use to be proof of thoughtcrime (sexist pigism). I admit to being a thought criminal, so there is no reason for me to obey the ban. Somebody might as well use the word feminazis made their stooges it throw away.

Chapter One

Fire Mechanism

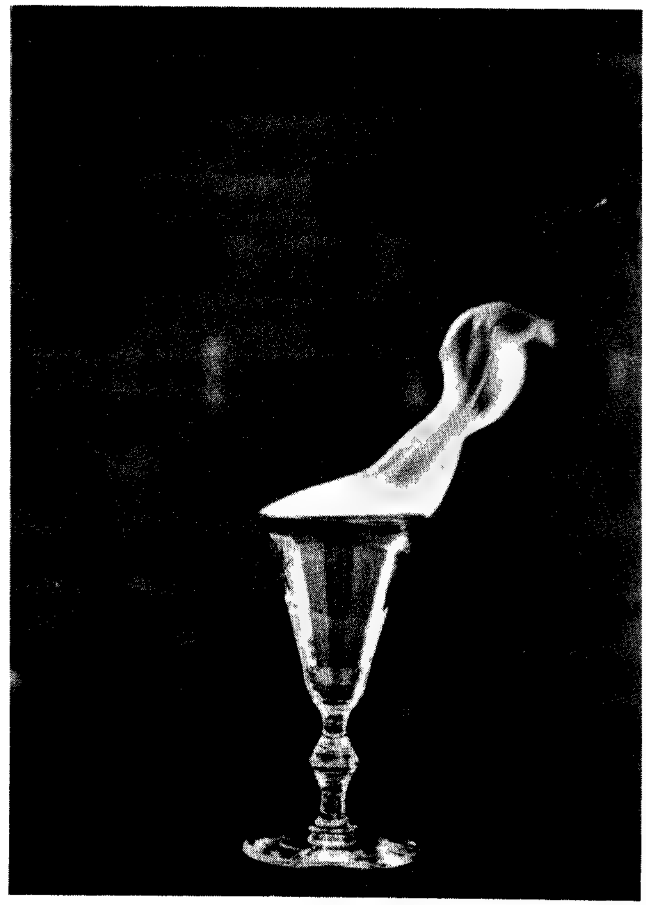
To be born and sustain itself, fire requires three things: oxygen, fuel, and heat. These three things are often referred to as the Fire Triangle. Once a sufficient amount of these three things comes together, a fire is born. It will from that point on strive to sustain itself, fighting ruthlessly to survive. It draws oxygen from the surrounding air (if it doesn't have a better source), it produces its own heat, and it turns the world around it into fuel. It is not always able to survive, but with the triangle intact, it can grow big and spread, often very quickly.

Not all fires do this though; they are all different. Sometimes instead they hide, and kill silently, doing little or no property damage; sometimes fire hides and then suddenly become a giant, ferocious beast, as in a backdraft. Whatever form it takes, the beast will survive, until it loses one or more of its essential ingredients, and dies.

THE PROCESS OF COMBUSTION

Burning is a chemical mechanism with a number of components, one of which is the uniting of fuel with oxygen, referred to as oxidation. There are various types of burning, depending on the type of fuel. Some fuels, such as black powder, contain their own oxygen, but most do not. The latter need to mix with the oxygen in the air to burn. Gaseous fuels mix with air readily, and so burn readily, often explosively. Like solid fuel, they burn even better when the atmospheric oxygen they mix with is enriched by an oxidizing agent, such as bottled oxygen.

Solid and liquid fuels that do not contain their own oxidizing agent need to be turned into gas



Liquid fuel doesn't burn; it is turned into a vapor, and the vapor burns. The flame is off to the side because a breeze moves the vapor. Only the part of the fuel in contact with air burns. The glass of fuel is in effect a lamp, minus a wick and with only the glass to limit the rate of vaporization.

that will mix with oxygen before they can burn. This process begins with a rise in temperature, which creates a chemical decomposition of matter. This decomposition is referred to as pyrolysis. It is the process of heat turning solid and liquid matter into a form usable as fuel.

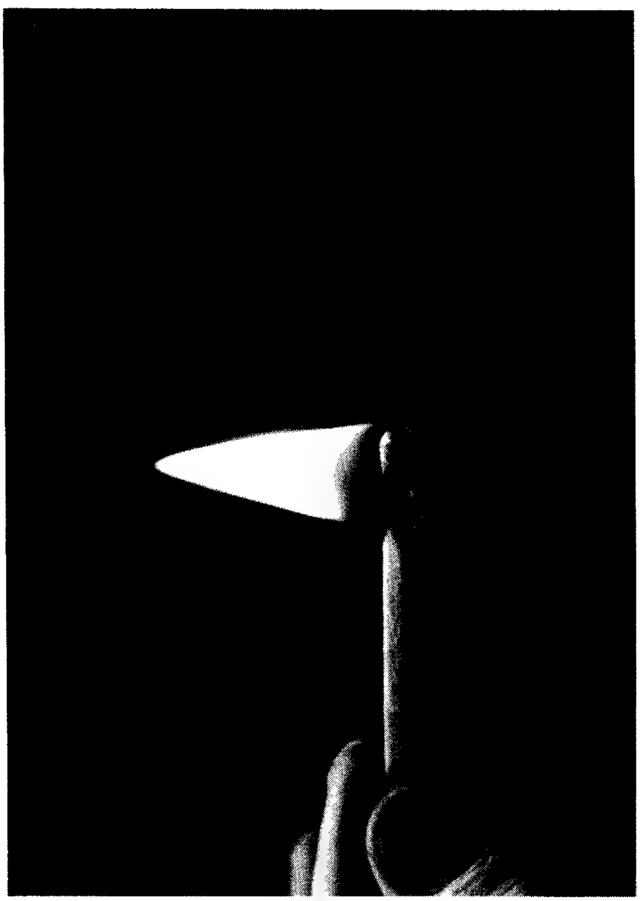
For example, wood in its solid form does not burn; it is turned into a mixture of gasses, that mix readily with air, and the gas burns. The same thing occurs with gasoline when it vaporizes, though usually much more quickly and easily. Heat makes the fuel evaporate, and the evaporated fuel burns. This heating and evaporating, or pyrolysis, is the opening sequence of the combustion process.

Some solid fuels, such as crumpled paper, evaporate and burn more or less immediately when sufficient heat is applied, but many have to be heated for awhile before they take fire. To turn the contents of buildings or any other solid that is the target of an incendiary attack into fuel, it is often necessary to apply fire for a period of time measured in minutes, to get the evaporation process started and going well. After enough time it takes care of itself.

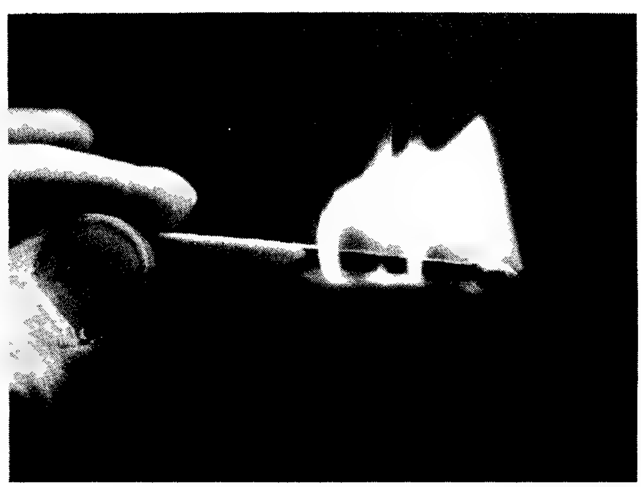
This is a very important phase of the process, because the gasses of pyrolysis will either burn, build up, or go somewhere else. In some cases (i.e., PVC, polyurethane, etc.), the gasses are more deadly during this phase than during the burning phase. Some of the gasses of pyrolysis often don't burn even during periods of an active fire, due to the lack of oxygen. They drift until they either dissipate and become harmless, or find oxygen and a spark. This is one way fire spreads and explosions occur.

Once pyrolysis begins, if the minimum amount of heat energy necessary for ignition of the combustible gas is present, ignition occurs. At this point, the reaction begins to sustain itself. Heat from the fire transforms more matter into usable fuel, which creates more heat. As long as more heat is produced than is lost, and there is sufficient fuel and oxygen available to the fire, the process continues.

As a fire burns in a chamber, such as a room, it heats the air. The heated air, which includes



Like liquid fuel, solid fuel doesn't burn; it is turned into a gas, and the gas burns. Gasification of fuel is caused by heat, which in turn is fed by the fuel-air mix it creates.



In time fire is on fuel like a beast from Hell, devouring it's energy and leaving it a shriveled ash. The mechanism is essentially the same with all sizes, though there are many differences in form.

unburned gasses, rises and accumulates at the ceiling. When enough heat accumulates, the room reaches what is called the flashover point, and everything flammable in the room bursts into flame. As the fire burns the rising of the hot air creates negative pressure at its base, which causes surrounding air to be sucked into the fire, nourishing it with new oxygen.

Where a fire is unrestricted by walls and ceilings, has plenty of fuel, and can suck unlimited air, it can grow. Given the right conditions, it can rage down long corridors and up staircases quickly, sending out invisible assassins and an army of smoke ahead of itself. Taken to its extreme it becomes a firestorm, where it turns itself into a chimney, and sucks in such a volume of air that it literally sucks people in.

It is through some version of this process that all fires sustain themselves and grow, devouring everything that can not withstand them, until their ravenous appetite makes them starve, or until man or nature interrupts the process. This can happen on a large scale or a small one, as in a smoldering fire.

Combustion can take the form of what is referred to as glowing combustion (i.e., hot coals) or flame. If the process is confined so that the pressure it generates builds up and then releases suddenly, the result is an explosion. If a wave of combustion moves at supersonic speed it becomes a shock wave; this is called detonation.

Fire spreads by transferring its heat to nearby fuel. It tends to follow the easiest path. Often it will move down a hallway and bypass rooms with the door shut. It will jump across inferior fuel to consume a preferred fuel, then come back later to consume what it left behind.

Since hot air is lighter than cool air, the air heated by fire rises. For this reason fire burns up. A fire set in the lowest point of a building will travel upward throughout the building. One set on top will travel downward slowly or not at all. Falling embers, dripping liquid fuel, molten plastic, and molten steel (i.e., thermite) can carry a fire downward more quickly.

Smoke, poison gas, and fire travel horizontally as well as up, though more slowly. Sometimes they travel down. They will travel horizontally much faster if they can not travel up. Upward and outward growth of fire and its products are largely regulated in buildings by partitions such as walls, ceilings, openings and corridors, especially between floors. It takes time to burn through ceilings, doors, and walls.

A building will contain the heat of a fire just like a wood stove or barbecue grill, causing the fire to become more intense more quickly than if the same fuel was burning in the open. The building will also limit the amount of oxygen available to the fire, but usually not enough to extinguish the fire. The limiting of oxygen in fact makes the fire more lethal, because incomplete combustion results in a greater amount of smoke and carbon monoxide, the latter being the biggest killer in fire.

HOW SMOKE TRAVEL THROUGH BUILDINGS

Smoke and poison gas are the biggest killers in most fires. An understanding of the dynamics of these killers allows them to be used to their fullest effect. This section will explain how they move and why. For the purpose of this discussion, the word smoke will be used to refer to smoke, hot air, and the gasses of combustion, unless otherwise stated. They all follow the same general rules of movement.

How and where smoke moves varies, depending on the amount and type of fuel, the type of building, and how the fire is ventilated. Smoke can be so thick that it fills a building and also surrounds it, or there can be very little smoke (though there might still be poison gas).

Just as fire burns up, smoke rises. To understand how smoke travels upward through a building, imagine a house turned upside down having water poured onto it. The water will find any opening and move to the next level, there is pressure forcing it onward. When smoke gets to a ceiling, if there is no way out, it will lay against the ceiling and grow thicker, until it fills the room. This might take only a few minutes or it might take longer. When the smoke piling up against a ceiling reaches the top of a doorway, it pours out of one room and into the next. When it reaches a stairwell it pours upward, until it fills the house. In this way a pile of rags burning in a basement of a house can fill the house with a lethal dose of carbon monoxide, even though very little or none of the house actually burns.

Often fire-fighters do what is known as ventilating a building, which means cutting holes in

the roof and breaking windows to let smoke and heat out. Many buildings have vents, shafts, and blowers to do this. A ventilated building will burn more completely because of a better air supply, but an unvented building fills with heat, poison gas, and smoke faster and more completely. This is especially true during the critical initial phase of the fire, which occurs before and while people escape.

How smoke moves through a building is affected by how open the inside of the building is. If there are open passageways for smoke to travel through, it will fill the building quickly, from the top down. If the building is partitioned into sections, it will seep through small holes between sections, but its movement will be slow. Partitions between levels are the most significant in this regard. This is one reason public buildings have what are called fire doors, that are to remain closed at all times, except when being used.

A tall building can act like a smokestack, causing a strong draft from the ground floor to the top of the building. The reason for this is that the cool outside air is heavier than the hot inside air, so it falls into the building at its base, and squirts the hot inside air up through the top. The amount of draft is determined by building height, how airtight exterior walls are, how well air can travel between floors, and the difference in temperature between inside and outside.

This smokestack effect will pull smoke up through the entire building above a fire. To prevent this, tall buildings usually have mechanisms to channel the smoke outside. They are not always adequate. Sometimes all or most of the deaths from a fire in a tall building occur well above the actual fire.

Air-moving systems also affect the movement of smoke in a burning building. Sometimes these move smoke very efficiently from one point to another, causing many deaths and serious injuries far from the actual fire. In big public buildings these systems often have fire defense mechanisms, such as automatic dampers. To find out what types you might encounter in a given area, check local fire codes.

Eventually smoke cools off, and either remains still or is carried by air currents. It no longer rises on its own when there is no heat to carry it. Eventually it drifts away and dissipates, often leaving a sticky, flammable film behind.

TYPES OF FIRES

In order to facilitate the correct use of fire extinguishers, fires have been classified into types, or classes, based mostly on the type of fuel being burned. There are four types of fire, though most fit into the first three categories. Most big fires are a combination of types. A basic understanding of the characteristics of each can be as useful to the fire-maker as it is to the fire-fighter.

CLASS A FIRES

This is the most common type of house fire. It is fueled by things like paper, wood, cloth, solid plastic, and most of the other things that houses are made of and filled with. It is often started accidentally by things like cigarettes dropped and left on furniture, draperies getting too close to a source of heat, sparks from fireplaces, and that sort of thing. This type of fire might smolder for quite some time or it might flame right from the beginning and get big real fast. When it is in the smoldering stage it can generate large quantities of poison gas and smoke. When it is in the flame stage it can do that and also generate intense heat and spread very quickly.

This type of fire can be put out with water, although it might take quite a bit.

CLASS B FIRES

This type of fire is fueled by flammable liquids like gasoline, solvents, paint, cooking grease, and pools of melted plastic. It is always recommended that water not be used on this type of fire, because water will spread the fire instead of putting it out. Complicating the problem further, burning liquid drips and runs down, carrying its fire with it. So it is a more difficult fire to fight, especially for the nonprofessional.

Many liquids, such as solvents and cleaning solutions, evaporate very quickly, especially when they are heated, and the vaporized fuel burns, or explodes. Some vapors are heavier than air, some are lighter. If vaporization occurs prior to ignition, the vapor will accumulate, either down from the ceiling or up from the floor. This accumulation of flammable vapor often leads to powerful explosions, when the level of vapor reaches a source of combustion, such as a pilot light or spark from an electric motor.

CLASS C FIRES

These are electrical fires, caused by bad or abused wiring. Bad wiring would include wire that is too small to carry the current that runs through it, which makes the wire overheat, and poor connections, that get loose and cause electricity to cross over an air space, causing an arc, as with a welder. Abused wiring includes the common practice of using multiple outlet adapters to run more appliances through a circuit than the circuit is intended to run, and things like running extension cords under rugs, which over time causes the insulation to be worn off the wire, and an arc to jump between the two wires in the cord. Fuses and circuit-breakers usually blow before a fire starts, but not always.

Like Class B fires, Class C fires can not safely be fought with water, because water will carry an electric current from the fire to the one holding the hose or bucket, and this can lead to electrocution, especially if the one with the hose or bucket is standing on a wet floor. Sometimes in this type of fire, conductors, such as the metal shell of a refrigerator, become energized, spreading both the cause of fire and the threat of electrocution.

Once the source of electricity is shut off or disconnected, the fire is no longer treated as a Class C fire.

CLASS D FIRES

These fires are fueled by certain combustible metals, such as magnesium, aluminum, potassium, sodium, titanium, and zirconium. They are characteristically difficult to put out.

Fuels of this type are sometimes used in factory-made military incendiary weapons, because they burn hot and are difficult to extinguish. Thermite, a mixture of powdered aluminum and an oxidizing agent (usually ferric oxide or iron oxide), burns very hot and produces a puddle of slag and molten metal that burns through metal. It has been used from the First World War to the present. It is also used in welding. White phosphorous, a metal that burns on contact with air, is used in another type of incendiary grenade.

BACKDRAFT

Sometimes a very hot fire will use up most of the available oxygen in a closed room and live as a bed of hot coals on the little air it can suck through tiny holes. The heat in the room continues to form flammable gasses and tars, which do not burn. The same enclosure cuts off the fire's air supply and traps the gasses. When a door to the room is opened, an inrush of oxygen-laden air provides the missing part of the fire triad. The fire expands very fast, causing an explosion.

This is why it is strongly recommended in fire safety manuals that a door in a burning building always be felt for heat before it is opened.

SMOLDERING FIRE

It is common for things like furniture, mattresses and piles of rags to smolder for a long time. Sometimes they eventually produce a flame and grow into a big fire and sometimes they never do anything but smolder. Either way, the smoldering fire fills a house with smoke and poison gas, often killing a house full of people as they sleep. The most common and lethal gas from this type of fire, carbon monoxide, is odorless. This is why smart people have smoke detectors.

MASS FIRE

This is usually the goal of an incendiary attack against a city. Mass-fires occur when a number of small fires grow and converge into a single big fire, which can grow into a conflagration or firestorm.

During the Second World War it was learned that a large number of small fires generally produced a better fire than the same amount of fuel distributed by a smaller number of larger bombs. Fires started by the larger bombs were harder to put out at the beginning, but if not put out, the smaller and more numerous bombs produced a bigger fire.

CONFLAGRATION

This is a very big, destructive fire. Large forest fires and famous historic city fires are of this type. They are so intense that, as with the firestorm, they will burn until all fuel in their path is consumed or the climate changes. Usually it is a strong wind that nourishes and spreads this type of fire, supplied by nature, not the fire itself. Since it is wind that carries it, its spread is mostly controlled by wind. This fire can be caused by accident, arson, or an incendiary attack by a military force.

FIRESTORM

The rising of heated air in a fire sucks in air at the base, which nourishes the fire, producing more heated air, which in turn sucks in more new air. With sufficient fuel, air, and heat, this process can grow to the point that it becomes a very intense furnace, producing gale force winds, powerful enough to literally sweep people off their feet and suck them into the fire. The fire itself produces a wind storm. A column of fire and smoke rises high in the center of the storm, sucking everything it can reach into itself.

The winds of this storm exceed the force of any wind that might be occurring naturally. Since wind is a primary carrier of fire and the wind of a firestorm blows toward the center of the fire, such a fire does not usually spread, though it has to be big in the first place to become a firestorm. This effect turns the area of the fire into the equivalent of a furnace with a chimney, causing the fire to be very intense.

Firestorms rarely if ever occur naturally; they are the result of an attack on a city by a large amount of incendiary bombs. Even in such attacks, firestorms are rare.

When they do occur, they are the most destructive and deadly of all types of urban fire. All of the factors that cause a fire to become a firestorm instead of a conflagration are not known, but a few are known. The closer together buildings are the more concentrated fuel is, so building proximity is a factor, the denser built-up area being more likely to have a big fire become a firestorm. A large number of fires starting in the same general area at the same time increases the likelihood of one. Little or no natural wind also increases the likelihood.

THE PRODUCTION OF HEAT

Heat can be produced by five mechanisms, the first three of which are of use to the arsonist: chemical reaction, friction, electricity, compression of gasses, and nuclear fusion or fission. Once fuel and oxygen are brought together, it is one of these mechanisms that will initiate the fire.

CHEMICAL REACTION

The way fire produces heat is through a process of rapid oxidation. This happens when atoms of fuel form chemical bonds with atoms of oxygen. Solar energy is one example.

Certain chemicals produce a great deal of heat when brought together; these can be very useful to the arsonist. Many chemicals contain oxygen; these are referred to as oxidizing agents. Certain fuels (i.e., diesel fuel, fuel oil, oil-soaked cotton, rubber dust, paper, sawdust, etc.) will generate heat and burn when they come in contact with such an agent. Among the more well known is the combination of potassium chlorate and sugar with sulfuric acid. One that is less well known but more common is a combination of calcium hypochlorite (sold at hardware stores for chlorinating swimming pool water) with brake fluid.

For more on oxidizing agents, see Chapter 3.

FRICTION

Heat is a by-product of friction. Primitive methods of fire-making, such as the bow and drill, produce heat for fire in this manner. The striking of a match produces enough heat through friction to ignite the fuel on the match head.

Many improvised fire initiators use this mechanism of heat production.

ELECTRICITY

An electrical current can produce heat in a few ways. One is through what is called an arc, which is a current jumping across an air space. Arc welding produces a great deal of heat (and takes a great deal of electricity); enough to melt or burn steel. Stainless steel, which can't be cut with a torch, can be burned through pretty easily with a welding arc. Sometimes poorly-made or damaged electrical connections cause an arc to occur. While this is not as hot as a welding arc, it is often hot enough to start a fire.

A certain gauge of wire can carry a certain amount of current without getting hot. If there is too much current for the size of the wire, the wire will get hot. Many electric heaters produce heat by controlling this process. Light bulbs produce light by it. Electric blasting caps initiate fire in this way. Some accidental fires are a result of too much electricity running through too thin of a wire.

Lightening is a source of electrical energy that starts fires. Since it cannot be easily worked with and is unreliable it will be of little use to an arsonist, unless he wants to use a lightening rod and storm as a delay mechanism.

Static electricity occurs naturally when the air is very dry. Most people have had the sensation

of getting shocked by it at least a few times. This spark can and does start fires, if it comes in contact with a suitable air/fuel mix. An arsonist should develop a sense of how and when static electricity occurs.

NUCLEAR

The splitting or fusing of atoms can produce a great deal of heat, as in a nuclear explosion or the heating of boiler water in nuclear power plants to produce electricity. This mechanism of heat production is very rigidly controlled by governments. Non-government arsonists are unlikely to have access to it.

THE FUEL CHAIN

Big fires don't usually start out big. They start small and grow. Usually the fuel that is the target of an incendiary attack does not take fire easily; it has to be heated before it will begin to burn. When the target fuel is gas, liquid, or solid fuel mixed with an oxidizer, the heating can occur pretty quickly.

In starting a fire to burn any fuel, it is necessary to start with fuel that will take fire, from a match or electric spark or whatever you use for initiation. This fuel will then usually transfer its fire to another fuel, which will transfer its fire to another, and so on until all fuel is burning. Each of these transformations takes some degree of time, and requires certain temperatures.

A fuel chain initiated by a falling weight and matchbook igniter. Fire is carried from the initial book to a row of matches, which carry it to two piles of matches, then to a stack of three commercial firestarters, and from them to the wood and contents of the shelving. From there the fire grows on its own, providing sufficient fuel and air are within its reach.

As an example of how the fuel chain works, consider the deliberate use of an electric spark to burn down a warehouse full of electronics, packaged in cardboard boxes and padded with polystyrene. The wires that produce the spark are set in contact with match heads; over the match heads is placed a pile of crumpled up papers, which start out small and grow into cardboard as they radiate away from the source. This pile is kept loose enough that it does not smother the fire from the match heads.

Over the papers, boxes of components are stacked like wood for a bonfire; these boxes contain good fuel, in the form of wire insulation, and are packaged in good fuel in the form of polystyrene and cardboard. This stack is set where its fire will reach other things like it on lower shelves, that will burn upward and outward.

The fuel chain is not always this long, and in fact sometimes it only has two links. For example, an electric spark in a room full of a mix of flammable gas and air will produce a big fire (and probably also an explosion) with no intermediate fuel, as long as the mix is right at the point of the spark.

THE TRANSFER OF HEAT

Fire spreads by transferring its heat from one place or thing to another. There are three mechanisms of heat transfer: radiation, conduction, and convection. Each spreads fire in its own way, usually more than one is involved.

Fire spreads primarily upward through the rise of heat by convection, and in all directions by conduction and radiation. Incendiary weapons such as napalm and thermite carry heat downward by dripping or melting over and through things.

The movement of fire in a building is largely regulated by partitions, such as floors and ceilings. Open areas, especially vertical areas such as staircases and hollow walls without firestops, are where fire spreads the fastest and gets the hottest. Outside of buildings, spread of fire is regulated by proximity of buildings, openings such as windows, and weather, especially wind, heat, and rain.

Multiple transfers of heat allow a hot wire to become a big fire in a short time. The wire ignites match heads, which in turn ignite a paper/paraffin fire-starter, which in turn burns through the plastic of a jug filled with liquid fuel; burning fuel then flows out of the jug and soaks into the upholstered chair that it sits on; this quickly produces enough heat to cause flashover.

RADIATION

Heat carried by radiation travels through space like light, and in fact travels at the speed of light (186,000 miles per second). It is the way heat is carried from the Sun to the Earth. Like light, radiated heat travels in a straight line in all directions from the source of heat, and can be turned by a reflective device. A fire with little visible light will produce little radiant heat; one with a bright light will produce a lot of it. An object that appears red hot is giving off radiant heat intense enough to be seen as visible red light.

A barrier that will stop light, such as a wall, will stop heat radiation; one that will not stop light, such as a window, will not stop heat radiation. When radiated heat reaches such a barrier, it builds up at that point; it is absorbed into the barrier by conduction. Eventually radiated heat in a chamber such as a room leads to what is known as flashover, which is the point where everything combustible bursts into flame.

Radiant heat diminishes in intensity as distance from the heat source increases. But an intense source of radiant heat often carries enough heat to spread the fire. Radiation is a primary vehicle in spreading fire from one house to another when the houses are not in contact with each other.

CONDUCTION

This is the transfer of heat through direct physical contact. Burns from direct contact with flame and scalds from hot liquid are a result of this transfer mechanism. Heat is conducted from one remote point to another by a conducting medium, just as electricity is conducted.

Some things conduct heat better than others, just as some things conduct electricity better than others. There is neither a perfect conductor nor a perfect insulator, but many things are close to one extreme or the other. In building fires, good conductors such as steel pipes and beams sometimes carry enough heat to initiate fires in other parts of the building.

When napalm sticks to something and burns, it is conduction that carries heat from the napalm to the thing it clings to. When thermite burns through steel, it is conduction that carries it.

CONVECTION

This is usually the primary carrier of heat in building fires. The mechanism consists of heat carried by a moving medium such as air. As air becomes heated by the fire it becomes lighter than the surrounding air, and so travels upward, carrying its heat with it. If there is enough of it and it is hot enough and it finds sufficient fuel and oxygen, it carries the fire as well. This is why fires typically burn upward.

In very large fires, convection creates a column of hot air, gasses, smoke, sparks, and small pieces of lightweight burning fuel, called firebrands. This column rises high into the air, and has the effect of a chimney, causing the fire to burn very intensely. The largest of this type is a firestorm, the most intense fire of all.

Within buildings fire is carried by the mechanism wherever the air can carry its heat. It floats up stairways, through ducts and chutes, through hollow walls, and through small holes in floors and ceilings, such as those for pipe and electrical penetrations. Where air movement is inhibited hot air concentrates and builds down, and transfers its heat by conduction to whatever is holding it back.

Currents of convection carry fire by carrying heat, and also by carrying sparks and firebrands. These can float to areas that would otherwise be unaffected by the fire, and, if they land on a source of fuel, they can initiate secondary fires.

THE LIFE CYCLE OF FIRE

From its beginning to its end, a fire goes through various phases. Fuel at one point will be burning, at another point it will be undergoing pyrolysis, and at another point it will be preheating. Not all fires are the same, but the following is typical.

The initial phase is ignition. Something produces enough heat to begin the process in a source of fuel. Once this has occurred, the fire will carry itself through the next phases, as long as the conditions for it are right.

Following ignition is a lag phase, wherein the heat of the initial fire begins the process of pyrolysis in surrounding fuels. This phase can last for a very short time or a long time, depending on type of fuel, whether or not the heat is contained, and other factors. If the fire radiates enough heat in an enclosed chamber, such as a room, eventually flashover occurs, and the chamber becomes in effect a furnace, with everything flammable in it the fuel.

From this point the fire spreads. How fast it spreads and where it spreads to is determined by how much heat the original fire produces, the type and amount of fuel available for the fire to spread to, the temperature and moisture content of the fuel and surrounding air, availability of oxygen, and availability of open spaces for the fire to spread into. Since heat rises, the natural course for a fire to take is upward; it will travel wherever available fuel takes it, but it will go upward far more quickly than downward.

The fire will continue to grow and move, until it runs out of fuel or air, the climate changes, or the process is interrupted, at which point it dies. Sometimes it only appears to be dead, then suddenly comes back to life with an explosive force, or as an invisible assassin.

Sometimes flammable gasses escape from a fire, and float or are carried by air-moving systems to a distant point, where some spark sets them burning. What causes this is that in some chamber a big fire has eaten up the store of oxygen, and is living as a bed of coals on what air it can suck through little holes; the bed of coals heats the room and the room holds the heat. With heat there is pyrolysis, which is the turning of solids and liquids into gases. Since there is insufficient oxygen for the flammable gasses to burn, they float off with the other gasses.


FLAMMABLE

Chapter Two

Characteristics and Sources of Fuel

Fuel is one of the three essential ingredients of fire; it is also often the thing the fire is set to destroy. It is usually readily available, in a wide variety of forms. Some are barely adequate; some are more than adequate, even to the point of being explosive. As with all matter, fuel is in the form of solid, liquid, or gas. There is some overlap between forms, and much more when heat is applied. There are good and bad fuels in each of the three forms.

The quality of fuel is determined by how hot it burns (measured in calories), how long it burns, how easily it burns, how it delivers its heat to the target, and the amount and toxicity of the gasses and smoke it produces. Knowing how each type of fuel ranks in these factors will increase your ability to use the weapon of fire. Many fuels can be improved; knowing how and why will likewise increase the power of the weapon.

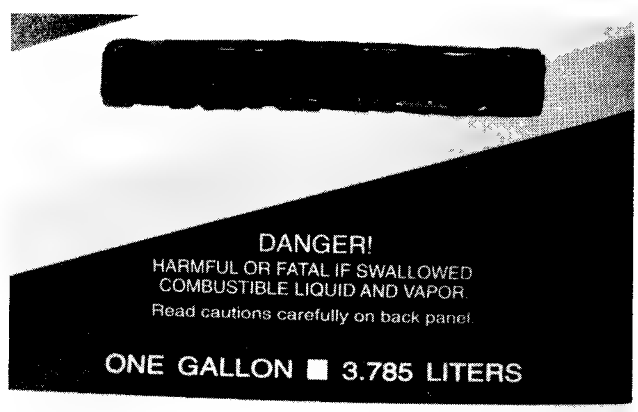
Fuel is always improved by being preheated and dried out, by weather or some other means. The more of it that contacts air or an oxidizer the faster and more completely it will burn, so being divided into smaller parts will release more total energy in a shorter amount of time. How much you divide your fuel depends on what you want your fire to do.

There are a number of good fuel recipes in TM 31-201-1, *Unconventional Warfare Devices and Techniques: Incendiaries*; a few of them are paraphrased in this manual. The reader is referred to the military manual and others like it for more detailed information on certain formulas than what is given here. With some exceptions, this manual deals with common materials and simple processes.

OBTAINING FUEL

The most important incendiary materials, gasoline and matches, are readily available. Motor oil and other fuel thickeners are also easy to get, as well as many other useful chemicals. Some take more work than others. But all any of them do is make an easy task a little easier.

Many industrial areas have large amounts of chemicals stored in unguarded or barely guarded warehouses and shops. Plants that do metal-finishing have a lot of concentrated acids, aluminum and magnesium powders, and literally tons of potassium chlorate (in convenient fifty-five pound cakes), as well as many other useful



Good fuel can be found in places like hardware stores and what-not shops (i.e., K-Mart, Wal Mart, etc.) as well as gas stations, vehicles, industrial areas, and so on. Good liquid fuel is easy to identify if it is carried in a government-approved container, because it's labeled as good fuel.

chemicals. Refineries not only store flammable liquids, they make them.

Other materials can be found at hardware and home-improvement stores, hobby stores, drug stores, farm supply stores, gas stations, laboratories, and many other places. Chemicals have to be carried from one point to another, usually by truck or train, and the carrying vehicle has to be labeled as containing dangerous chemicals (the actual chemical names can be found on the bill of laden). Most buildings contain everything necessary to get them burning, from paper to wood to natural gas to various other things.

Before you go in to burn a target, study it and determine what fuels and special fuels it contains, and plan how to use each. The less fuel you have to carry in and rearrange the better.

SOLID FUEL

Most readily available fuel is in this form. The fuel used to initiate a fire might be gas or liquid, but the fuel that feeds the major part of the fire will often be solid. For example, liquid fuel in the form of a Molotov cocktail thrown into a building will initiate a fire, but the primary fuel of the fire will be the solid fuel that the building is made of and filled with.

Since fire needs air, it is only the surface of solid fuel that evaporates and burns. The exception to this is fuels that contain their own oxidizing agent, which will be covered later.

Since it is the surface only that burns, it follows that the more surface area a fuel has, the more of it will burn at a given time. This is why big logs are usually split before being burned in a fireplace or wood stove; the more pieces a log is split into, the more of it is exposed to air. A log that is not split will often burn on the surface, then go out, because the usable fuel inside is sealed off from the air by the burned fuel at the surface. By contrast, a log split into many little pieces, or a mass of little twigs, will burn very hot and fast.

Similarly, a piece of paper by itself will burn very well, because so much of its surface is exposed to air. But a stack of paper will burn very poorly. Take that same stack of paper and crumble each piece and throw them all into a pile, and the pile will burn very well.

The smaller the pieces of a solid fuel are, the faster they will burn. It follows that the most flammable form for of a solid fuel then is dust or powder, and indeed, solid fuels that might be only marginal in a less fine form become such good fuels in dust form that they become explosive. Many of these are not explosive or even especially flammable if the dust is in a pile; they only become explosive when they are floating in the air. If the fuel is mixed with an oxidizer, such as black powder and thermite, it will burn very well in a pile.

Usually solid fuel can be improved by being divided into smaller parts, with the parts set so that as much surface area as possible is exposed to oxygen. Boy scouts are taught to break up sticks for kindling, fine powder burns faster than coarse powder, and coal-fired power plants crush coal or pulverize it, then spray it with air into the fire box. Sometimes solid fuel is naturally in a divided state.

Undivided fuels in the form of buildings and their contents do not always take fire as readily as the arsonist would like. So liquid fuel, referred to as an accelerant, is added to it. A common example of this is the use of liquid fuel to start charcoal burning in barbecue grills (if you can cook steak, you can burn down a house). This is usually faster and easier than dividing the solid fuel into little pieces, when such fuel is available.

Solid fuel is typically classified into three types: tinder, kindling, and main fuel; there is some overlap between types. When only solid fuel is available, it is divided into these three forms for placement. Then it is arranged to take fire easily and carry it upward to bigger fuel.

Tinder is very light, finely-divided fuel that will take fire easily; good tinder can be set on fire easily with a single match or spark or by concentrating the sun's heat with a magnifying glass. Since tinder takes fire so easily, it burns quickly, often too quickly to start the main fuel burning. Kindling is fuel that lights less readily but burns longer. It is used to carry fire from the tinder to the main fuel, and sometimes to keep the main fuel burning.

An example of the three types of fuel together in one package is a dead, dry pine tree. The tiny branches and needles take fire very readily, and spread it to the bigger branches, which spread it to the biggest branches and the trunk. There is no exact division between tinder, kindling, and main fuel, but the three are all part of the package.

Usually a fire made with solid fuel alone will contain these three types of fuel. Some fuels though can be tinder and kindling both. Since fire burns up, solid fuels are set with the tinder at the lowest point, the kindling above it, and the main fuel at the top.

WOOD AND PAPER

Wood and its products are the most common type of solid fuel, ranging from paperwork to logs that are burned in fireplaces, to lumber that much of our buildings and furniture are made of, to live trees, as in forest fires. How well this material burns is affected by its moisture content, surface area, type, and chemicals that it might have been treated with.

The drier wood is, the better it will burn. During periods of heavy rain, forest fires are uncommon, and don't usually spread far when they do occur, because the wood of the trees has a high moisture content. During periods of drought, forest fires are more common, and tend to burn for a long time. Wood used in fireplaces is usually dried for a year or so before it is burned. Lumber, as used to build houses and furniture, has been dried to the point that it makes good fuel.

Wood that has not been sufficiently dried to make good fuel is difficult to ignite, difficult to keep going, and produces a lot of smoke. This last characteristic is not necessarily bad, and in fact can be very useful. If a fire is big enough and hot enough though the water will boil out of wet wood and the wood will then burn.

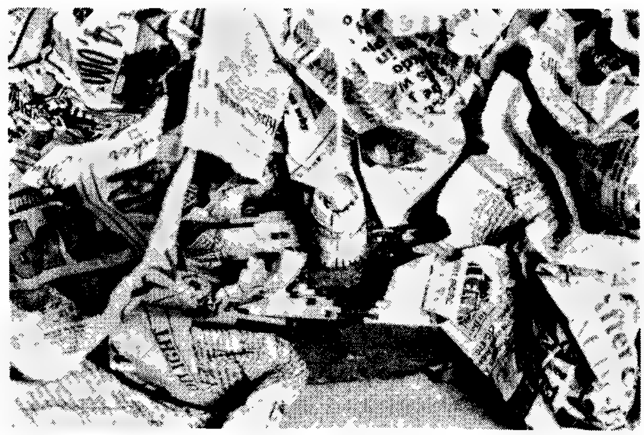
Wood is classified into softwood and hardwood. Softwood comes from evergreen trees with needles for leaves; hardwood comes from trees with flat leaves, that usually fall off in the winter. Pine will take fire more easily and burn more quickly; hardwood is harder to get started but will burn longer.

A single piece of paper is wood in a divided state. Crumpling the paper creates a good air/fuel mix. A big pile of crumpled paper is a good way to get a fire going. Some buildings contain large amounts of paper, in the form of books, files, government forms, and toilet paper.

TINDER

Paper is probably the industrialized world's most common tinder. It is readily available in most built-up areas, it takes fire easily, and it burns hot and long enough to get other things started burning. Cigarette and tissue papers are easy to light; often the latter has multiple plies that come apart easily, allowing itself to be divided further.

Many wastebaskets are literally filled with crumpled-up paper that makes excellent tinder. In bathrooms and hospitals the paper is likely to be tissue. Often it is mixed in with other good fuel, such as soft plastic. Offices of crooks, both in and out of government, often contain large amounts of shredded paper, which makes especially good tinder.



Matches make very good tinder, and crumpled paper makes very good intermediate fuel. It is a good idea to use plenty.

Paper pre-formed into good tinder can often be found in waste baskets. The paper can be used as is, or have its burn time extended with something like wax or grease. The plastic trash bag does a good job of holding it all together, then adds its energy and poisons to the mix.

Crumpled paper is used here as tinder. Cardboard and bunched up clothing are used as kindling, to get the wood of the chairs burning. More fuel will be piled on and around the chairs, all set to fall inward as the fire burns.

Cardboard is better for kindling than tinder, but can often be turned into good tinder by separating the multiple sheets it is usually composed of into the thinnest strips you can make, and then crumpling them up.

Good tinder can also be found on trees, where it can be broken off and carried to the fire site. The tiniest branches on standing deadwood make good tinder. It is essential that the wood be dead and dry; if it bends instead of snapping when you try to break it, it is no good for tinder (though it might be good for kindling). Tiny pine branches and their needles are good Bigger branches can be made into tinder by being shaved into thin curls with a knife, and then being broken up into little pieces. Small branches can also be broken up and then shredded with a hammer or rock.

Dead wood found lying on the ground doesn't usually make good tinder, because it has too high a moisture content, though it often works well enough for main fuel. Dead wood on trees and shrubs should be dry, except after a rain.

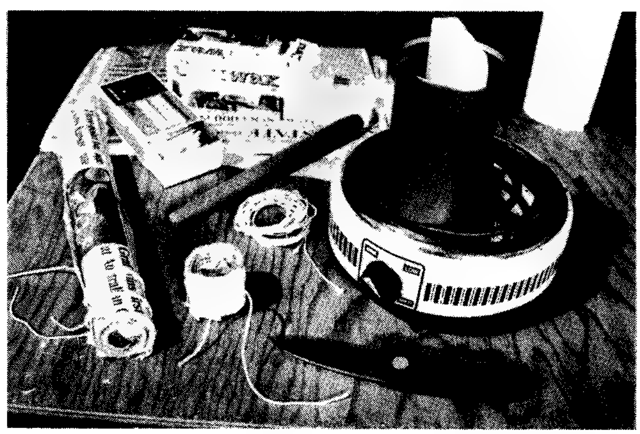
Some bark makes very good tinder. The outer bark of birch, cedar, grapevines, and some other dead or dying trees will flake off in thin layers that can be crumbled into good tinder. The inner bark of many dead and dying trees makes very good tinder. Rotted wood from the inside of a tree stump is usually too wet to be any good, but if crumbled and dried it might be very good.

KINDLING

Small, dry branches will take fire from suitable tinder and carry it to the logs of a campfire. Boards and logs split into thin strips work even better. The outer bark of dead trees will work as kindling if it is broken into small enough pieces and arranged right. Wood furniture broken into small pieces is good. In every case, long thin pieces are usually best, because they allow a good air flow, and transfer their heat well.

Cardboard is commonly used as kindling, It will take fire from most tinder, and will spread the fire to wood. Cardboard is commonly found in the boxes that things ranging from cereal to refrigerators come packaged in. Usually the box is used more or less as is, to get a good air/fuel mix; sometimes big boxes need to be cut or ripped up.

A traditional tinder/kindling combination is the fuzz stick. It is made by shaving thin curls along a stick, with one end of the shaved curl left attached to the stick.



Work station set up for making what the Boy Scout Manual calls firebugs. They are roughly two-inch sections of rolled newspaper dipped in melted wax, that do a good job of getting things burning. Cutting strips with a straightedge and rolling a stack of them works better and is about as easy as the method shown here.

PAPER AND PARAFFIN FIREBUG

The Official Boy Scout Manual (1982) gives instructions for a type of kindling it calls "fire bugs." This is their recipe: Roll up four sections of newspapers into a roughly fourteen inch long stick. Tie strings around the roll every two inches, leaving a few inches extra of string hanging past the knots. Cut the roll of newspaper between the

string bindings, into two inch sections. Melt paraffin in a can or pot, and soak the rolls in it, using the ends of the string to dip them in and out.

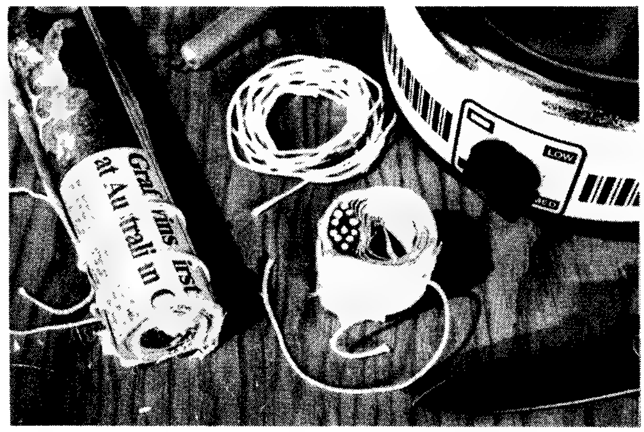
Two paper and paraffin fire-bugs. Soft paper, such as the paper towel on the left, is best crumpled instead of rolled. The roll of stiff paper on the right has a few match sticks inserted for easy ignition (there should be more); it has been dipped a few times. Excess string has been cut off both bugs.

These so-called fire bugs will take fire fairly easily and burn well. They make very good kindling. Depending on size, they should burn for around fifteen minutes or so, producing a good flame. Some of the wax melts and runs down out of them, soaking into porous material such as carpet, upholstery, wood, and so on, getting it burning. They are waterproof, though they should be dried off before being used if they are wet.

The size and shape of the fire bugs given in the manual is a very good one, but they can be any size and shape you want to make them; crumpled up paper held compact with a rubber band or string works well too. Short fat rolls are better than long thin ones, because they burn far better standing than lying down.

The newspaper recommended in the manual is among the best papers, but any flammable, absorbent paper can be used, from tissue paper to absorbent cardboard. Soft paper should be crumpled rather than rolled. Crumpled paper of any type will tend to light easier and burn more quickly than rolled paper.

Make sure the paper you roll is cut at all ends, not folded. If you are making several, you can make one big roll and cut it into sections; if you are only making one or a few, cut the paper into strips. This latter method produces better fire-bugs. It can be done with a cutting board, straight-edge, and knife, or a pair of scissors. The wider the strips are cut the taller the firebug will be; one to three inches is good. Amount of paper determines diameter; since fat is good at least several sections or a lot of strips should be used.



Fire-bugs are a lot easier to get started burning if they are enriched by inserting several match sticks into them before they are dipped.

Make the roll fairly tight, but not so tight that there are no air spaces, and pull it a little tighter when you tie string around it. Use absorbent string and wrap it around several times. Immerse the roll in wax hot enough to be thin. Use a screw-driver or stick to hold it down, until there are no more bubbles. If necessary, form its shape while it is still hot. Some wax will drain out as it dries.

These light fairly easily, but are still kindling, not tinder. To make lighting easier, use your thumbnail to unwrap a corner of paper, so that you are lighting one little piece of paper instead of a mass of it. Crumpled paper usually has a few places where you can get to an edge with a match.

If you dip them, let them cool, and dip them again, they will have quite a bit more wax on them. This will make them burn a little longer and there will be more melted wax running down. They will also be a little harder to light (though they all light easy if they are enriched, as covered later). The difference between single- and double-dipping is not real big, so do it only if you have plenty of wax and time.

The army manual on improvised incendiaries says to dip sheets of paper into melted wax and let them cool. These sheets are then crumpled into balls and used as kindling. The boy scout fire bugs are better incendiary devices.

Firebugs can be made with the fat that cooks out of meat like beef, pork, and poultry, instead of wax (these might be called fire-slugs). First put the fat that cooks out of your meat into the refrigerator until it sets up, then remove the nonflammable jellylike mass that forms on the bottom (heat it up and have a cup of broth when you're finished). Clean off as much of this impurity from the fat as you can. Then heat the fat and melt it.

Make the fire-slugs the same as described for wax. Then set them on cellophane paper and wrap it up around them, and put them in a refrigerator to harden. They'll stay hard or soften wherever butter would do the same. The plastic wrap will keep them from making a mess if they get soft, then become more fuel when they burn.

A firebug is essentially a candle, that burns over its entire surface, and beyond. To use a firebug, light one edge, hold it until it is burning well, then set it on something (preferably flammable) that will absorb the burning wax, and under the secondary fuel you want to ignite. One should burn for around fifteen minutes or so.

Improvised Fuel - How to Get Fuel Out of a Chicken

Cook the chicken in a microwave or other oven.

Use a holder that will hold the liquid that drains out and cover the chicken with plastic wrap to contain grease that splatters out.

Pour the liquid into a bowl and set it in a refrigerator until it hardens.

The mass will be separated into two parts. The upper section is fuel; the jelly-like mass on the bottom (shown on top in this picture) will not burn.

The jelly-like substance comes off easily. The rest is pure fat, that will burn well when melted and mixed with absorbent paper, cloth, or other fuel. Use it more or less the same as you would use wax. Saturate the crumpled napkin with melted fat in the bowl for a fire slug. Heat the jelly in a microwave, and have a cup of chicken soup.

ENRICHED FIREBUGS

To make firebugs easier to light, insert several stick matches into the rolled paper before you dip it. Don't use less than five matches, and ten would be better; the match sticks make about as good of fuel as the paper. One with more matches will have a bigger initial flame followed by a flame of shorter duration than one with less matches. The firebug will become engulfed in flame and wax will flow more suddenly with more matches. This is not necessarily better, it's just different.

The matches should be grouped together and set toward the edge, not in the center. They can be inserted either during or after rolling, but have to be in before dipping. Set the match heads a little below flush, so that you can find them and get to them easily with a flame, but they are not sticking out where they might break off or accidentally strike against something and ignite.

In carrying, the match heads should be covered by something like cardboard and duct tape for safety, even though they are also recessed for the same purpose. They can be covered with wax during the double-dipping process, though this then makes them a little harder to light. They should be carried in a box or other hard container that will keep the match heads from rubbing against something.

SAWDUST AND PARAFFIN

According to TM 31-201-1, this kindling device is almost as effective as napalm, though it is slower in starting. It is referred to in the manual as the Paraffin-Sawdust Incendiary. Here is how it's made:

Use dry, clean sawdust. Sawdust swept off a floor might be part sawdust and part dirt; make the percentage that is sawdust as high as possible. Some sawdust has a high moisture content; get it as dry as possible before mixing it with paraffin. This can be done by laying it out in a thin layer in a dry environment. Inside a building, an air conditioner or dehumidifier will make the air dry; when the weather is cold the air will be dry, unless there is a humidifier (which there often is, connected to the ductwork). For more on drying sawdust and other solid fuels, see books on food dehydrating.

The sawdust is mixed with an equal portion of paraffin or wax. The paraffin is melted and removed from the heat, then the sawdust is mixed in with it. The mixture is stirred until it is almost solid, making sure the sawdust stays suspended in the paraffin. Then it is removed from the pot and placed into a mold or shaped with the hands when it is cool enough. The manual recommends pieces the size of a fist, carried to the target site in a paper bag. The bag is then used as tinder.

An easier way is to put sawdust into a box made of fuel such as cardboard, and pour melted wax over it until it is saturated. A deep box, such as a cereal box, needs to be filled in layers. Before putting in any ingredients, make sure the box has a waterproof liner (i.e., the freshness bag) so that wax doesn't leak out.

Stick matches can be added around one or more edges for easier ignition, or they can be used instead of sawdust, for a fire that will become more intense more quickly.

An easy way to make a device of this type is to simply fill all the empty space in a box of stick matches with melted wax. First remove the matches and line the box with plastic wrap, then replace them as they were. Two or more separate pourings are needed to fill the box. Leave several uncovered matches on top of the hardened wax and slide the two box sections back together for easy carrying.

To use this fuel, slide off the outer cover and tear loose some or all of the cardboard to expose match heads at a corner. Hold that corner down and light it, hold it until it is burning well, then set it on absorbent (and preferably flammable) material under fuel you want to start burning.

CONCEALED CARRY

While the mass of sawdust and paraffin is still soft, it can be molded into various shapes, which can be used to disguise this incendiary device. It might be sculpted into a work of art, for example; any shape can pass for art these days (especially if it looks obscene; you might even be able to get government money for it).

This kindling can be molded into many shapes, and have a paper wrapper around it; the wrapper is used for tinder. It can be a candy bar (preferably a big one), a bar of soap, or a pack of cigarettes; these also give you a reason to have matches or a lighter, and cigarettes are good timing devices. A lit cigarette alone will not light this incendiary though without help, such as a book

of matches. (A carton of cigarettes would obviously make a much better incendiary than a pack.)

This device can take the shape of any container that will hold sawdust and melted wax, that can be ripped or burned through. Good-sized food packages are good for concealed carry; there are many of these, ranging from milk cartons and cereal boxes to fast food bags full of fast food packages. Use the freshness bag or plastic wrap to make sure wax doesn't leak out. Set the box between cement blocks so that the paraffin and sawdust don't make the sides bulge.

If you are careful how you open the box before filling it and work carefully so you don't spill anything on it and don't let the sides bulge, the box will look just like another box of food. It will not feel or sound like such a box though. It will be much heavier and more solid, and it won't make sound when you shake it.

To make this device into the shape of things like candy bars and soap, use clay or plaster of Paris to make a mold. The wrapper has to be removed and reinstalled very carefully for the device to look right.

These can be complemented with liquid incendiaries and chemical igniters, in beverage, condiment, shampoo, and conditioner bottles. Other boxes can hold igniters and boobytrap and timing devices. So between dinner, cigarettes, and a shower, you can carry a big bag of incendiary devices.

PARAFFIN/SAWDUST INCENDIARIES

The incendiary material described above is easy to make, but if you don't want to go to the trouble, you can buy it. These incendiary devices are marketed and sold as fireplace logs and firestarters. During the cold season, you can buy them at Wal-Mart stores, hardware stores, and often even at corner convenience stores. They're all over the place, and they usually don't cost very much (especially at end-of-year clearance sales).

Fire logs usually come in a paper wrapper; the wrapper becomes the tinder used to get them burning. They'll start better and easier if you put a few cuts lengthwise in the paper on the top and sides of the log, to let air in and smoke out.

The wrapper has instructions on how to set fire to the device, and also safety instructions, which will give added information on how to use

Factory-made fire-starters are common, cheap, easy to carry, and effective. Like most fuels, they work well as a team, either together or divided. They can be divided further by being cut into sections; multiple small fires usually lead to better fires than big single ones. How much to divide or concentrate depends on the nature of the fuel you want to get burning.

the device as a weapon. One of the instructions is usually that they are not supposed to be broken up before being lit, because doing so will produce a bigger fire. In using them for arson, you might want to break one up or you might not, depending on whether you want a shorter bigger fire or a longer smaller fire.

Fire-starters are made in a number of ways; one type is essentially a smaller version of the fire logs described above. They are all designed to get a wood fire going, and their instructions tell how. Since they are small, they are easy to carry and easy to hide. Since they are powerful, they can be cut into pieces.

MAIN FUEL

Wood is usually the main fuel in a fire in a wood frame building, such as a house. Studs, joists, rafters, floors, molding, paneling, doors, shelves, furniture, and other things made of wood are usually plentiful enough to produce a big fire. Even in a brick house there is a lot of wood. Motels and offices often have a lot of wood. Stacks of paper, such as books and magazines, also feed the fire. Even brick, stone, and steel and glass buildings often contain enough wood and paper (among other fuels) to become furnaces.

When setting a fire, if you have time, rip into drywall with a hammer or ax (some drywall is

so thin it can be kicked or punched through easily), to expose the studs behind them to the fire. Break up furniture and rip moldings loose; pile it all in a corner or base of a staircase over your kindling and tinder. Use shelves, tables, and chairs to build stoves that concentrate heat and then become fuel.

If you remove doors from their hinges, don't lay them on top of a small pile of fuel where they will smother the fire. Instead, lean the door against a wall like a half tepee; build a fire between it and the wall; the door will hold heat in but let smoke out, and as it burns it will fall into the fire in pieces.

The paper drywall is covered with will burn, but the material behind it won't. Wallpaper burns well. Much so-called wallpaper these days is vinyl instead of paper; it burns well too (more on it under plastics). Wood paneling burns well. Many chambers and corridors, both vertical and horizontal, are lined with good fuel.

When building a fire of wood, set the wood together in some semblance of one of the classic campfire forms to get it burning well. One such form is the tepee fire, where all sticks, logs, or whatever stand together like a tepee; tinder and kindling are piled inside the structure.

Another classic form is to lay two or more sticks parallel and a foot or so apart, then two or more parallel to each other, on top of and perpendicular to the first two, so that the two layers crisscrosses each other in the shape of a square; as many layers as desired can be added, with each layer opposite the one below it. As with the tepee, tinder is laid at the bottom; kindling is laid along with the bigger logs, in the empty spaces of the crisscross pattern, in the first few layers.

TOXICITY

Wood does not produce the exotic poison gasses that some other things give off as it burns, but it gives off carbon monoxide, which kills more people than any other poison gas, and it uses up oxygen and produces heavy smoke. If the combustion of wood is incomplete, it can produce a lot of carbon monoxide and smoke. Green sticks and leaves on a hot fire or bed of hot coals will produce volumes of smoke and poison gas.

WAX AND PARAFFIN

Wax from natural sources has been used in the manufacture of candles for many centuries. These days most wax is synthetic; this paraffin, as it is called, is made from petroleum. The two words are often used interchangeably, because the properties are the same; in this text whatever is said about one is true of the other.

This fuel additive can be found in the form of candles, crayons, and shoe-shine and certain other paste wax. It can be purchased from grocery and department stores, wherever food canning supplies are sold (it's used to seal jelly jars). It can be produced by boiling the nuts of the Bayberry plant, or taken (very carefully) from beehives

A candle is a stick of wax with a wick in its center. Heat melts the wax and pulls it into the wick, where it gasifies and burns. The bigger the wick, the more it will suck wax to the surface, so the bigger the flame. There are many ways for wax to be mixed with a big wick; the fire-bugs described above are one example. Wax is a very useful fuel, but it needs a wick, or to be mixed with liquid fuel such as gasoline.

Most waxes don't burn well on their own (though some do; see shoe polish later). So they are almost always mixed with something that will help them burn, such as a candle wick.

Wax is a solid that becomes soft and malleable when warmed, and when warmed further becomes liquid. When in the liquid state it will burn. This is why it makes good candles: it can be melted and poured into molds, with a wick easily installed in the center. When the wick is lit its heat melts the wax, which is sucked into the wick just like liquid fuel.

These same characteristics make wax very useful to the arsonist. The paraffin/sawdust and paper/paraffin incendiaries described above and wax napalm described below are essentially candles with super wicks that more or less inundate them. They can be molded into virtually any shape and any size you want. The same type of thing can be made by melting wax and mixing it with anything flammable that will soak it up, from cloth to powdered charcoal.

Wax is waterproof, so incendiary devices made with it are usually also waterproof; sometimes it is used specifically for that purpose.

DRY GRASS AND OTHER PLANT MATTER

A field of dry grass is a field of tinder. If the grass is dry it will take fire easily and burn quickly, moving in the direction the breeze carries it. If the grass is short, little damage will be done, except to the top of the grass. If the top of the grass is a crop, burning it would be a lot of damage, but wild grass will just grow back. Often fields of dead grass are burned deliberately, to remove the dead plant matter before the growing season; little or no damage is done to trees and fence posts in most cases. A fire in tall grass will burn hot and can do a lot of damage.

To use dry grass as tinder, select the driest parts of the leaves, and break and powder them up into a pile. For less sensitive but longer-burning tinder, grip a handful of dry grass leaves and stems into a bundle.

The tops of some wildflowers make good tinder in the fall, after they have flowered and dried. Cattails and goldenrod are two that work. Leaves dry enough to crumble are usually good tinder.

Dead, dry shrubs are good kindling; they usually come preformed with a good shape for efficient air movement, so they burn hot and fast. Lay fuel over them so as to crush them a little, to slow down their consumption and so prolong burn time.

PLASTIC

The term plastic refers to a number of different solids made from petroleum and natural gas. Technically plastics are classified as semiliquid, not true solids. But for most intents and purposes they are solid. Until they get hot, when many of them melt and drip like napalm.

Among the more common ones are polyvinyl chloride (PVC, vinyl), urethane foam, (foam rubber), acrylonitrile-butadiene-styrene (ABS), nylon, polyester, and polystyrene (Styrofoam). Since plastics are made from petroleum and natural gas, they tend to burn well. Many are made more or less fire-resistant these days, but they still decompose, and when they do they give off smoke and deadly fumes. As they melt and drip they carry heat and fire downward.

Most plastic will burn though if heated enough, and when it does it burns hot; a lot of plastic burning together makes a big, hot, deadly fire, that is hard to put out. Getting a lot of plastic together in a big pile is not a difficult feat, given the amount and diversity of the product. Sometimes plastic is already piled into a good form, as in certain warehouses, closets, and big bundles of vinyl-coated wire running through hollow walls and other chimneys.

Many things are made of plastic these days; here is a short list: Foam rubber mattresses, pillows, and furniture stuffing. Man-made fabrics have varying degrees of plastic (i.e. nylon, etc.) woven in with them; fake leather and other slick clothing and upholstery are almost pure vinyl, of a type that gives off especially deadly fumes during pyrolysis. Bedding, window treatments, shower curtains, carpets and vinyl flooring, and wall covering material are often all or part plastic. Tasteless furniture is often made of plastic.

Plastic runs through hollow walls in the form of plumbing pipes, wire insulation, and some weather insulation; there is a lot of insulated wire running through the hollow walls of modern buildings, especially certain buildings. Sometimes the wires merge together and go on long runs in bundles; sometimes the runs are vertical, and the hollow walls make good chimneys.

A plastic shower curtain is good fuel, and hanging is a good form for it to be in. But like most plastic, it takes a lot of kindling to get it started. More fuel, such as towels and clothing, should be draped over the shower rod and piled loosely under it. Plastics give off special toxic gasses.

Horizontal runs burn well too, just not as fast. Weather insulation will reduce the chimney effect in hollow walls (until it burns); inner walls are unlikely to have insulation. Plastic pipes will burn better if the water is shut off and they are drained.

With electronic and communications equipment such a big part of the industrialized world, some buildings have vast amounts of insulated wire running in big bundles through them. Fire codes make these buildings far more fireproof than they might be. They generally have fire defense mechanisms, such as sprinkler systems and firestops between floors. But such mechanisms are not always adequate, and they can be defeated. Sometimes temporary buildings are set up and filled with large amounts of cables; these are less likely to have things like sprinkler systems.

Many modern conveniences, ranging from soda pop bottles to disposable diapers, are all or part plastic. So are many food containers, from the airtight vessels for keeping leftovers to meat trays to the flimsy bags produce is carried home from the grocery store in.

A lot of things are packaged in Styrofoam, from food to electronics. Most things bought retail that can be carried are carried home in plastic bags. A lot of luggage is plastic. VCR and cassette tapes and their shells are plastic. So are the housings of many appliances and other electronic devices, as well as the insulation on the wire they hold.

These things all make good fuel; some are better than others. Some will not continue to burn if an external source of heat is withdrawn, but together with other fuels, they will add their energy and toxicity to the fire.

According to some experts, the most significant aspect of the use of plastics as fuel is that they give off very toxic fumes as and before they burn. Most people who are killed in building fires are killed by smoke and poison gas, not flames, and plastics produce some exotic gasses, including hydrogen cyanide, hydrogen chloride, and phosgene, in addition to carbon monoxide. Like carbon monoxide, these gasses are lethal, and impair judgment and that sort of thing, reducing the chance of escaping from the fire.

Burning plastics also give off large amounts of thick smoke with a lot of particulate matter in it. Some gasses given off by burning plastics have a corrosive effect on things like metal and electrical equipment.

There is disagreement among experts over how dangerous these special gasses make plastics relative to other fuels. While it is agreed that these gasses are lethal, some argue that plastics are not more dangerous, because the most lethal gas is carbon monoxide, and everything produces it. Unlike carbon monoxide, the special gasses of plastics are not undetectable to the senses; mixed with their big brother carbon monoxide, they are like a tank traveling with an invisible assassin.

Some plastics (vinyl, urethane foam, etc.) produce a great deal of poison gas as they are heating

(hydrogen chloride, hydrogen cyanide, etc.), but far less or none while they are actually burning. For this reason, the fire-resistant varieties can actually be more deadly than the ones that are not fire-resistant. A piece of plastic can give off half or more of its weight as a gas in a fire, and since a gas is so much lighter than a solid, that can be a lot of poison gas. The fire-resistant varieties also tend to give off extra-heavy smoke.

Plastics are usually harder to get started burning than natural materials like wood and paper, but once started, they tend to burn very intensely. This in fact can be a more significant factor in their value as fuel than the special gasses they give off.

Mix plastics in with other fuels for a good fire, with the plastics toward the top, where they will be set fire to by an easier-to-initiate fuel; to make the fire as lethal as possible, throw on all the plastic you can find. Leave curtains hanging suspended, where they will catch fire and burn well; set a fire under them or hang them over a fire set.

Do not lay shower curtains or foam rubber or other big plastic things over the top of a mass of fuel, unless you want a smoldering fire. Form plastic clothing (i.e., nylon, polyester) into loose piles and soak it with liquid fuel if you have it. Set upholstered furniture where it will catch fire and burn but not smother a small fire. Cut slits in carpet to let air in and smoke out.

Carpets with high pile burn better than carpets with low pile. New carpet, rolled up and covered with polyethylene or polypropylene wrapping to keep it clean, can burn very well, producing large amounts of smoke and poison gas.

If you want a smoldering fire that will produce a lot of lethal smoke, apply small but steady fire to bundled foam rubber furniture stuffing and carpet pads, or build a hot fire under buckets or drums of tightly wadded bendable plastic, such as shower curtains and vinyl upholstery. If you want a big fire with flames, rip and cut big pieces into smaller pieces, and wad up things like shower curtains and polyester clothing; pile it all together with wood and paper or some other kindling.

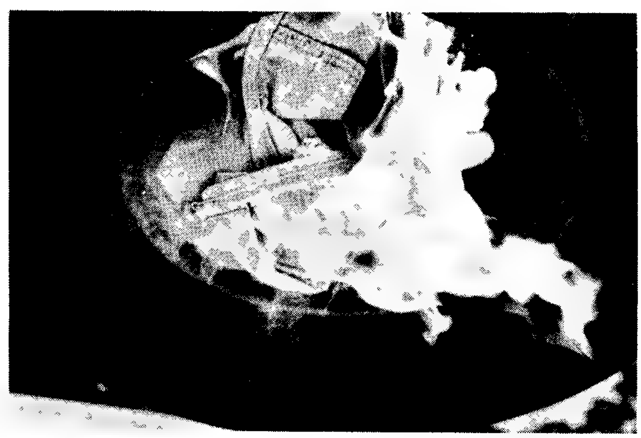
Because both wall and floor coverings are often all or part plastic, many rooms and corridors are lined with good fuel. Since these coverings are relatively thin, they can decompose and burn quickly, producing a lot of poison gas and smoke as they do. Sometimes long corridors in big offices and motels lined with this fuel spread fire very quickly, especially where there is no sprinkler system or there is one that is inadequate or disabled.

PLANT AND ANIMAL FABRICS

There is a big difference in how well different fabrics burn. It is a good idea to learn to judge types of fabrics by their look and feel. The quality of the fuel a person is surrounded with, in the form of clothing or furniture, will help determine how to deploy certain weapons. Things like absorbency are usually pretty easy to judge regardless of the type of fabric, simply by how coarse or slick the material is.

Cotton and other fabrics made from plants burns well; blends of cotton and plastic (i.e., polyester, etc.) will also burn well. Cotton is very absorbent, and so will absorb liquid fuel very well. It is a good carrier for liquids that ignite spontaneously. Unlike plastic material, cotton does not produce exotic poison gas when it burns; it just produces common gasses like carbon monoxide.

Wool and silk do not burn very well; they do not take fire easily, and if the source of heat is



A bunched-up pair of cotton bib overalls burns as well as crumpled up paper. Most fabrics burn well, but some, such as wool and leather don't.

removed from them they will usually go out. But if there is fuel or heat to keep them going they will burn and smolder, producing carbon monoxide and other poison gasses, including hydrogen cyanide and ammonia.

Leather burns very poorly; fur burns slightly better but still poorly. When these do burn and smolder though they give off hydrogen sulfide,

Most clothing is good fuel, and hanging is a good form for it to be in, because so much of its surface is in contact with air.

a very toxic nerve agent, in addition to carbon monoxide. Heavy leather burns the least well of any fabric; for this reason it is often a good fabric for a fireman to wear. Leather gloves are especially useful.

The previously-listed fabrics are used for things from clothing to curtains to upholstery to bedding. Being able to identify which is which will make you better able to quickly determine the quality of fuel an enemy might be surrounded with. A wool sweater will not take fire readily, but one of cotton or acrylic will. A leather jacket will give protection from flames; a fake leather jacket will add to the flames, though it will still shed liquid better than absorbent fabrics like cotton.

The problem of identifying the flammability of clothing is complicated by fire-retardant treatments given to some clothing. Nothing makes clothing fireproof though, only less susceptible to it.

Like paper, cloth burns best when it is not lying flat against itself in piles (i.e., folded). It burns well when it is bunched up loosely, and better when it is hanging, as in curtains, a clothes closet, or a coat rack. Liberal bigots know how well a flag burns when it's hanging; they know that it burns even better when they wave it.

TIRES

Tires take fire readily and burn hot, producing large amounts of thick black smoke containing carbon monoxide and hydrogen sulfide, both of which are poisonous. Once a large number of tires gets burning well, as in a pile of used tires or a warehouse, the fire is hard to put out.

Tires have been used in certain barbaric countries in a ritualistic form of torture/execution known as necklacing. The tire is laid around the victim's neck or midsection, filled with gasoline, and lit. This of course is just another version of something that has been done throughout history. The tendency of people to engage in this sort of thing is one reason it is so important that American patriots never relinquish the Second Amendment: these and other gruesome things are often prevalent in countries where the masses have been disarmed. Sometimes it's less painful to fight to the death than surrender freedom.

SHOE POLISH

Paste-style shoe polish that comes in a flat round can melts and burns very well. When it melts it gets very thin, and will soak into porous solid fuel and get it started burning. Or it will burn well in the can, with kindling stacked over it. It can take fire from a fuse, matches, or any other flame-producing igniter, and extend the time of the fire, transferring it to the next medium.

Shoe polish is not volatile, and so is easy to store and work with; the flat round can is easy to carry. It can be melted and poured into various molds (i.e., candy bars, etc.), for concealed carry; see books on hobbies and crafts to learn how to make molds out of things like plaster of Paris. It can be pre-mixed with sawdust, paper, or other solid fuel, just like any other wax.

A can of shoe polish is very good fuel. It can be used either in the can, or dug out of the can with something like a coin, where it will melt and flow like napalm.

TABLE 1

AVERAGE HEAT VALUES OF COMMON SOLID FUELS

Fuel	Btu/lb.
Asphalt	17,160
Coal	8,690 - 14,700
Charcoal	12,920
Cotton	7,160
Paper	6,710 - 7,830
Paraffin	20,100
Pitch	15,120
Silk	9,230
Sucrose	3,960
Straw, wheat	6,290
Tallow	17,100
Wood, hard	8,120
Wood, soft	8,330
Wool	9,230

The amount of fuel in even a small can will produce a big, long-lasting flame.

DUSTS

As explained previously, the more surface area a solid fuel has exposed to oxygen, the more efficiently it will burn. It follows that solids in the form of dust will burn very efficiently, and the finer the dust, and the better it is mixed with oxygen, the more efficient the burning will be. This is why an accumulation of certain dusts in the air sometimes leads to really big explosions.

To burn and explode the dust has to be mixed well with oxygen. The oxygen can be in the form of an oxidizer or atmospheric air.

Whether or not dust in the air will explode, and how violent the blast will be, is determined by the flammability of the dust, the amount of it, the purity of it, the size of the particles, the amount of oxygen, intensity of ignition, and how well air and fuel are mixed. But often just a little mix will get the rest of it going.

A typical dust explosion is a series of explosions. Factories and storage areas that produce or store dust over time have their interiors covered by a thick blanket of dust. At some point the right concentration of air and dust meets a source of ignition, and a small explosion occurs. This explosion rocks the building and mixes the blanket of dust with the air, which ignites and makes an explosion that is far bigger than the first one. This then leads to more explosions in the same manner, sometimes even going from building to building.

Flammable dust in the air can be compared to flammable vapor in the air. In order for it to burn (i.e., explode) there needs to be a minimum amount of it; this amount is referred to as the minimum explosion concentration, given in the Explosion Characteristics of Dusts table in ounces of dust per cubic foot of air. There is probably an amount of dust above which an explosion can not occur, but that amount is apparently high enough that there has been no practical reason to find out what it is. The best explosion will occur with a concentration of dust well above the minimum.

Nonflammable impurities mixed in with the dust will reduce the chance of an explosion. This includes, in addition to other dusts, water, in the form of humidity.

Flammable gas, or the vapor of flammable liquids, will greatly increase the combustibility of airborne dust, and lead to a far more powerful explosion. This of course is just another example of pouring liquid fuel onto solid fuel to get the latter going. Oxygen mixed with the dust will have a similar effect. Bottles of all these things are commonly found in manufacturing, metal repair, and other industrial facilities.

The amount of oxygen surrounding each dust particle affects the violence of the explosion. So dust that is being stirred around in the air will tend to produce a bigger blast than dust that is unmoving.

Dust explosions have been and will continue to be initiated by all common ignition sources, from some idiot smoking to electrical sparks to static electricity. A bigger, hotter source of ignition will increase the likelihood of explosion.

BLACK POWDER

Black powder is known as an explosive, but for the purpose of this book it will be considered only as a form of solid fuel. If it is confined when it burns it will explode; if it is not confined it will burn. It makes excellent tinder, taking fire easily and burning very hot. It burns very quickly as well, and so needs to be used with kindling or a liquid accelerant or flammable gas. It contains its own oxidizer.

Black powder can be bought or it can be made. A substitute for it, called Pyrodex, is just as good as an incendiary (though not explosive) material; it can be bought from places that sell black powder firearms and supplies for them.

Black powder is a combination of potassium (or sodium) nitrate, charcoal powder, and sulfur powder.

TABLE 2
EXPLOSION CHARACTERISTICS OF DUSTS

Type of Dust	Hazard Level	Sensitivity to Ignition	Severity of Explosion	Minimum oz/cubic foot for Explosion
Aluminum, Flake Extra Fine	severe	severe	extreme	.045
Aspirin	severe	strong	severe	.05
Cellulose	strong	moderate	severe	.055
Cellulose, alpha	severe	strong	severe	.045
Cellulose, flock, Fine Cut	strong	strong	severe	.055
Charcoal, Hardwood	strong	strong	moderate	.14
Cinnamon	strong	strong	severe	.06
Coal, Kentucky (Bituminous)	strong	strong	strong	.05
Coal, California (Lignite)	severe	very strong	severe	.03
Cornstarch, Commercial	strong	strong	severe	.045
Cornstarch, Through # 325 Sieve	severe	strong	very severe	.04
Cork Dust	severe	strong	severe	.035
Epoxy, no Additives	severe	very severe	severe	.02

TABLE 2 Cont'd.

EXPLOSION CHARACTERISTICS OF DUSTS

Type of Dust	Hazard Level	Sensitivity to Ignition	Sverity of Explosion	Minimum oz/cubic foot for Explosion
Grain Dust: Corn, Oats, and Winter Wheat	strong	strong	severe	.055
Hexamethylene Tetramine	severe	extreme	very severe	.015
Magnesium, Milled, grade B	severe	strong	very severe	.03
Nylon Polymer	severe	severe	very strong	.03
Polycarbonate Resinvery	very strong	very strong	very strong	.025
Polyethylene, Low Pressure Processse	severe	extreme	severe	.02
Polypropylene Resin	severe	very severe	severe	.02
Polyurethane Foam Resin Non-Fire-Retardant	severe	severe	strong	.03
Polystyrene Molding Compound	severe	severe	very strong	.015
Potato Starch, Dextrinated	severe	severe	severe	.045
Rubber, Synthetic, Hard (33% Sulfur)	severe	severe	strong	.03
Sevin Garden Dust (85 % Inert)	severe	extreme	strong	.02
Pitch, Coal Tar	severe	strong	severe	.035

TABLE 2 Cont'd

EXPLOSION CHARACTERISTICS OF DUSTS

Type of Dust	Hazard Level	Sensitivity to Ignition	Severity of Explosion	Minimum oz/cubic foot for Explosion
Shellac Resin	severe	extreme	strong	.02
Sorbic Acid	severe	extreme	extreme	.02
Sucrose	strong	strong	strong	.045
Sugar, Powdered	very strong	very strong	severe	.045
Sulfur	severe	extreme	strong	.035
Wheat Flour	strong	strong	severe	.05
Wheat Starch	very severe	severe	severe	.045
White Pine Wood Flour	very strong	strong	severe	.035
Zinc Stearate	severe	extreme	severe	.02

The ratio given in the Encarta Encyclopedia is 75 % potassium nitrate, 15 % charcoal, and 10 % sulfur. There are a great many recipes for it, some dating back many centuries. If you can find the three chemicals it isn't hard to make. Here is the recipe given in TM 31-201-1:

Use a vessel such as a can or jar to mix the powder in; a jar with a lid is best. Make sure the vessel is clean and dry. The three components of the mixture need to be ground fairly fine; make sure to do any grinding before they are mixed together, or you might have a serious accident.

Put in seven parts by volume potassium or sodium nitrate, two parts charcoal powder, and one part sulfur powder. Put a lid on the jar and shake it around until the components are completely mixed. Once mixed thoroughly, the powder is ready for use.

If you store black powder in a sealed container it will keep for a long time, but it must be protected from humidity, because it will suck water out of the air and become less effective or even ineffective until it is dried out. Black powder is extremely flammable and explosive, so storage and transport can be dangerous; both must be done very carefully.

To use black powder as tinder, put it in a pile or an open-top vessel or fold it into a paper or plastic envelope. Set it where its fire will reach the next fuel. Good powder will take fire easily, from a spark, hot wire, fuse, match, or other igniter.

FIREWORKS

These are a good source of black and other incendiary powders. The bigger ones usually have very good fuses and a good supply of powder. Often the form they come packaged in is the best form for them to be in as an incendiary device. Some blow out a hot, bright, steady flame that lasts for awhile. Some fire an explosive canister like a gun, while others propel explosives with rockets. Firecrackers can be set as distractions, and big smoke bombs can be set at intake manifolds to clear buildings. Even the seemingly innocuous fountains hold a good supply of hot-burning powder.

SMOKELESS POWDER

This is the propellant used to force projectiles through the launch tubes of modern firearms. So-called smokeless powder isn't actually smokeless and it isn't a powder either, but smokeless powder is still its official name.

This can be good tinder if you have access to reloading supplies, or some ammunition that you can afford to cannibalize. As an incendiary, use it the same as you would use black powder.

As with all solid fuel, the smaller the pieces are (the finer the grain is in other words), the faster the powder will burn. Powder made for short launch tubes (i.e., pistols) is finer and will burn faster than powder made for longer launch tubes. When used as tinder though one is usually as good as another, though with some igniters the finer powder might be better because it will take fire more easily. Make sure you use enough to carry the fire to the next medium.

MATCHES

These are best known as igniters, but they can also be used as tinder, to carry fire from one medium to another. Taped to a light bulb wrapped with paper, for example, they will start a fire much more quickly and certainly than paper alone. They are also used to carry the heat of a hot wire or spark to another medium.

Wood and paper matches both burn intensely for around a second, then more slowly until their stick is burned up. A big pile of matches will make a big intense flame followed by a smaller, longer-burning flame.

THERMITE

Thermite is a mixture of a metal powder and an oxidizing agent. The metal powder is almost always aluminum; sometimes it is magnesium. The oxidizing agent is usually iron oxide or ferric oxide, but a number of other oxidizers are also used. When the powder is ignited it burns at very high temperatures (from over 4000 to over 9000 degrees F, depending on the oxidizing agent); these temperatures are high enough to burn through steel. Thermite has been used in incendiary grenades, shells, and other munitions since the First World War, and is still in use today.

Thermite is not especially good for starting wood fires, because it has a relatively short burn time (roughly thirty seconds). It is typically used against metal targets, such as pipes and pipelines, motors, bearings, gears, file cabinets, transformers and other electrical equipment, and

armored vehicles. It has to be set on the target and activated rather than thrown, and so is of little or no use against a moving target. Its use is usually against unmoving targets, such as in sabotage.

Thermite is used in some commercial welding. It isn't very common, but you can find it if you look hard enough. It used to be used by the railroad in welding rails together. It can be used in welding reinforcing bar for concrete pours (re-bar) together, though usually the re-bar is wired instead.

There are a number of different thermite mixtures. The one given in the army manual is three parts by volume iron oxide and two parts aluminum powder. These two powders should be no coarser than ground coffee. They are placed together in a jar with a lid. With the lid on, the jar is rolled around until the two powders are mixed thoroughly. The thermite is then ready to be used; it can be carried and stored safely.

More oxidizers are given in Chapter 2. Any of them might work; you need to experiment with what you can find to be sure. The oxidizer used in the formula that is reported to produce a temperature of 9020 degrees Fahrenheit is manganese dioxide; it is mixed at a ratio of four parts aluminum to three parts oxidizer.

Thermite has a very high ignition temperature (2200 degrees F), so to get it burning, a powder with a lower ignition temperature is used. One common thermite ignition powder is a mixture of barium peroxide and either aluminum powder or magnesium powder. The mix ratio is one part metal powder to two parts barium peroxide. The two powders are placed carefully into a clean, dry jar with a lid. With the lid on, the jar is rolled on its side until the two powders are thoroughly mixed.

Keep this mixture away from heat and sparks, and treat it very carefully. It can be used to get most incendiary materials burning, though it has a short burn time.

Once thermite begins to burn, it will carry the fire throughout its mass without any help from the ignition powder. So the latter does not need to be mixed throughout the thermite. A relatively small mass of it is set on the larger mass. The ignition powder is placed on the thermite so that some of it mixes in with the thermite, to a depth of a quarter-inch or so. When the ignition powder is lit, the thermite will burn. Thermite burns very hot, so the powder should be lit with a hot wire or fuse, or a timing or boobytrap device.

The most efficient way for thermite to be used is a variation of the way it is used in welding. This is to contain the thermite in a vessel that will hold the powder suspended above the metal it is to burn through, so that the actual burning takes place above the target metal. This would seem counterproductive, except that contact with the target metal sucks heat out of the thermite so that a less hot slag puddle develops, and it is the puddle that does the work.

In thermite welding a container to hold the powder as it burns is built above the thing to be welded. When the slag forms it cuts through the bottom of this vessel and runs into a mold. A version of this device recommended in the army manual is made with a cardboard can that has a tin or aluminum top and bottom, such as the kind Ajax comes in. An aluminum can would also work.

The can is cut in half between the two ends. One half has two one square inch or so notches cut opposite each other in the cut end. This end is used as a stand, with the notches down. The other half is used as a cup that holds the thermite and sits on the stand.

Sometimes thermite is mixed with something that will allow it to take fire more readily; this mixture is usually referred to as thermate. Anything that can get thermite burning can be mixed with it to make thermate. The difference between the two is that the latter is essentially pre-mixed with its ignition powder.

WHITE PHOSPHOROUS

This is a pyrophoric chemical, which means that it burns spontaneously on contact with air. It is used in incendiary grenades and other munitions. It is often mixed in with napalm in firebombs, as an igniter. It is dangerous to work with.

Since this chemical burns automatically when it contacts air, it has to be stored submerged in a liquid; often it is stored under water. It can be mixed with a solvent, often carbon disulfide. As long as it remains mixed and in a sealed container it does not contact air and so does not burn. When it is poured out or when the container breaks the solvent evaporates and the white phosphorous burns, setting fire to whatever it is mixed with.

LIQUID FUEL

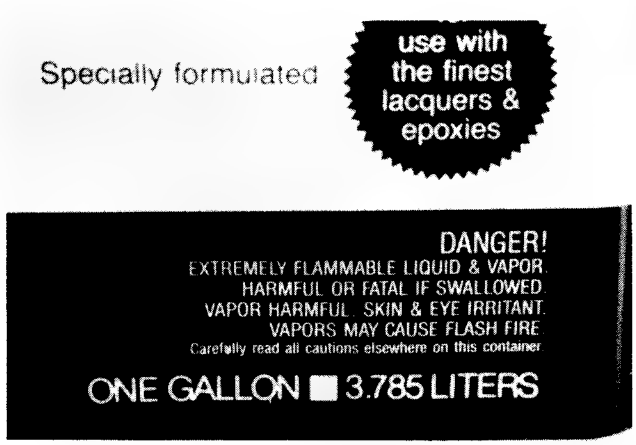
Sometimes liquid fuel is the target of an incendiary attack, such as an attack against a fuel dump or oil refinery, but usually its purpose is to get solid fuel burning, the latter being the actual target of the attack. Used in this way the liquid fuel is referred to as an accelerant. Very good liquid fuels are commonly available just about everywhere, especially in all industrialized countries.

Since fuel has to mix with air to burn, only gaseous fuels burn. Solids and liquids are turned by heat into gas, and the gas burns. Liquids are far closer to a gaseous state than solids, and so are usually a lot easier to get burning.

Liquid fuel stored in its official container is usually easy to identify because it is labeled as fuel. The label of a flammable liquid is supposed to contain one of three things:

CAUTION—COMBUSTIBLE
WARNING—FLAMMABLE
DANGER—EXTREMELY FLAMMABLE.

The COMBUSTIBLE label means that the fuel has a flash point of 80 to 150 degrees Fahrenheit; FLAMMABLE means it has a flash point of between 20 and 80 degrees; EXTREMELY FLAMMABLE means the flash point is below 20 degrees.



The most volatile fuels are labeled DANGER! EXTREMELY FLAMMABLE. This does not necessarily make them the best fuels. Tt simply means that they evaporate and take fire quickly and easily. This means they burn faster and their use is more likely to lead to explosion; for this and other reasons they are more dangerous to work with than less volatile fuels.

The quality of a liquid fuel is measured by its vapor pressure, flash point, burning time, heat output, and viscosity. Vapor pressure is a measure of how quickly a fuel mixes with air (evaporates in other words). This factor is often referred to as volatility. Flash point is a function of vapor pressure. It is the lowest temperature at which a fuel will give off enough fumes to burn. Viscosity is a measure of how thick and sticky the fuel is.

Volatility plays an important role in how a fuel is used, but the more volatile fuel is not necessarily the better fuel; often the slower-burning , more difficult to ignite fuel is better. A very volatile fuel will sometimes flash or explode right away and not burn long enough to get a good fire going. This flash or explosion can endanger the arsonist, and often does. In many cases a fuel labeled COMBUSTIBLE will be a better fuel than one labeled EXTREMELY FLAMMABLE, though some more volatile fuel might be used to get the less volatile fuel burning.

The label FLAMMABLE without EXTREMELY means the volatility of the contents is mid-range. It is less explosive and so safer to work with than more volatile fuel, and it burns as well or better.

The fumes of most liquid fuels are heavier than air, and so fall downward after escaping from the fuel. Often this is a cause of accidental fires and explosions, when fumes reach a source of ignition such as a pilot light.

The flash point is closely related to volatility. It tells how easy it is to get a given fuel burning. As with volatility, fuels with a lower flash point are not necessarily better than the ones with a higher flash point. The flash point determines the best way for the fuel to be used, but not

Some of the best liquid fuels, such as this lamp fuel, are rated CLASS III COMBUSTIBLE. They are safer to work with than more volatile fuels, and they burn longer.

necessarily how well the fuel will start a fire. In fact the fuel with the higher flash point is often better, because it is safer to work with and will burn more slowly.

Viscosity, or stickiness, is an important factor in antipersonnel and anti-vehicle weapons, where it is best for the fuel to stick to a target that is probably trying to move away from the fire. In setting fire to a building or something else that doesn't move, viscosity is not usually an important factor. The less sticky fuel will soak into solid fuel and run down to the lowest point, which is usually the best place for it to be.

Most liquid fuels are lighter than water and do not mix with it. For this reason, water used to extinguish liquid fuel fires will usually spread the fire rather than extinguish it. Alcohol is an exception.

Most liquid fuels have a very strong smell. This smell can alert people to incendiary boobytraps and delay mechanisms if the fumes are not contained. Anyone working with liquid fuel will smell like fuel if he gets any on himself; this can lead to capture. If your hands smell like gasoline you can say that you just left a self service gas station or filled a lawnmower, and the excuse might work, but it's better if you don't smell like gasoline in the first place. Wear rubber or plastic disposable gloves, and be very careful not to spill any fuel on yourself. Wash your hands and dispose of any clothes that get fuel on them as soon as you can.

Similarly, when you build a boobytrap, be careful with your fuel. In a boobytrap set you need to seal the fuel off from air, to keep fumes from escaping and betraying the trap. Where a timer is used, whether or not to keep a lid on the fuel depends on whether you want a fire or an explosion.

The safest and often best way to use liquid fuel, especially the more volatile types, is to keep it in a container that will spill, melt, or break when or just before the fire starts. This way the fumes will be contained until they are needed. For more on this, see Chapter 6.

As you study liquid fuel look around wherever you are and assess the fuel you have quick and easy access to.

STORAGE

Liquid fuel should be stored in unbreakable containers (preferably government approved), and in places where even if they do break the fire will be contained. Make sure there is nothing in the mixture being stored that will react with the material of the vessel that contains it; some solvents eat some plastics, for example. Things containing lye should not be stored in aluminum containers.

Government-approved gas cans and solvent cans are good containers for fuel storage. If possible, store fuel in the container in which you bought it. Jars and bottles work well, except that they are breakable, which makes them more dangerous than unbreakable containers. Sometimes though dangerous is good: jars and bottles, for example, can become Molotov cocktails very quickly and easily. Heavy boxes with handles and subdivisions, designed to carry jars and bottles safely, are good for storing such containers.

Do not store volatile fuel, such as gasoline and solvents, sealed in glass bottles or jars, without making sure that the glass vessel is strong enough to contain the vapor pressure that will develop inside them. Vapor pressure can break glass, and spill fuel all over; this can lead to accidental fire. For more on this, see the section titled Vapor Pressure in Chapter 5.

A hole in the ground with a good, heavy cover over it is often a better place to store fuels and other dangerous chemicals than a room of a dwelling or utility shed. A hole in the ground is relatively easy to hide, which can enhance the

TABLE 3

AVERAGE HEAT VALUES OF COMMON LIQUID FUELS

Fuel	Btu/lb.
Acetone	13,228
Alcohol, ethyl	12,800
Alcohol, methyl	9,600
Benzene	18,028
Ethyl ether	22,000
Fat, animal	17,100
Fat, lard	17,245
Gasoline	20,160
Hexane	20,676
Kerosene	19,800
Naphthalene	17,309
Oil, cottonseed	16,920
Oil, engine (SAE 40)	20,400
Oil, fuel	19,160
Oil, olive	17,020
Toluene	18,252

security of the cache. Setting the lid several inches under the surface and covering it with dirt, etc. will enhance security further.

Most people store quite a few flammable liquids in their house anyway. But if you have a lot of fuel, or fuel you are not sure about, store it in a hole, where if it goes off it's no big deal; you get a good light show and maybe have a bigger hole, to store more fuel. Obviously you want to dig the hole where it is not under a stack of fuel, such as close to a house or under a tree.

One good place to store liquid fuel and other dangerous chemicals is in a hole in the ground with a lid on it. Keep the hole away from buildings and other things that you don't want to catch fire, and make sure kids and imbeciles can't get access to it.

Very volatile fuels are routinely kept in unsecured areas where children and even idiots have easy access to them; nevertheless, this or any other fuel storage facility should be secured, especially from children. One way to do this is to make the cover well-hidden, and heavy enough that a child could not move it, and an adult wouldn't want to. If children or others who are not responsible for their acts might find the cache and might be capable of moving the lid, there should be a positive lock on it.

GASOLINE

This is the most common fuel used by arsonists, both in and out of government: it is the most common accelerant used to start fires, and the main ingredient of napalm. As a motor fuel, it is very common and easily obtainable. It takes fire easily and burns hot. It gives off a large amount of carbon monoxide.

If you buy gasoline, government regulations require that it be dispensed into, carried, and stored in an approved container; these are commonly available at hardware stores.

A lot of people don't know that gasoline fumes are so flammable that they are explosive. A gallon of gasoline is said to have the explosive potential of six sticks of dynamite, which is a pretty big potential. Sometimes an amateur arsonist will spread gasoline throughout a building and light it, expecting a nice fire, but instead get an explosion that kills or injures him. It is usually best to use a less volatile fuel or keep gasoline contained until the fire starts, in a vessel that will dump, melt, or break. If you don't do that, at least be out of the building when the fire starts, and beware of pilot lights, electric sparks, and static electricity.

HOW TO SIPHON GASOLINE

Sometimes the best source of gasoline is a vehicle fuel tank, and the best way to get fuel out of the tank is to siphon it out with a hose. The narrower the diameter of the hose is, the easier it will be to work with. Three-eighths inch fuel-line hose, available at car part stores, works very well. A section of garden hose will work; you usually need to cut one end off to get it down into the tank. Cutting the other end off will make it easier to suck on. If you use a garden hose, use the smallest-diameter one you can find.

Vehicles that burn unleaded fuel, which means virtually all vehicles, have a latch mechanism in the fill throat that makes it a little difficult to get the hose in and out. Holding it out of the way with your finger helps; this is easier to accomplish with a thinner hose.

The section of hose should be around six feet long, depending on the distance between the opening in the fuel tank and the vessel you will be siphoning gas into. It needs to be long enough to extend through the fill opening, down into the fuel, and out far enough to reach a level lower than the tank. If the end of the hose is not lower than the tank, it will not siphon; you will have to suck out gasoline and spit it into your storage vessel one mouthful at a time, which you don't want to do. The longer the hose is, the longer and harder you will have to suck to get the siphon started.

Siphoning gasoline can be very dangerous for a few reasons. One is that breathing in gasoline fumes will impair your mind the same as if you were drinking alcohol. Some people deliberately breathe gas fumes to get high; this is really stupid, because it has a far worse effect on your brain than alcohol; it will make a stupid person more stupid, permanently. When working with incendiary weapons, the last thing you want is to have your mind impaired. So make sure the hose extends all the way into the liquid fuel, and don't breathe in, just suck with your mouth.

Gasoline breathed into the lungs can be fatal. So be very careful not to breath any in. You will get some in your mouth but you can spit it out. If you get it in your lungs it will kill you.

To siphon gasoline, have a suitable vessel ready below the fill opening. Remove the gas cap, and run the hose through the fill opening and down into the fuel. Judge the distance between the fill opening and the tank to insure that you will be sucking fuel and not fumes.

With the hose in place and a vessel ready to receive the fuel, suck on the hose, drawing fuel through it. Do not inhale as you do this. If you have to take a breath, put your tongue on the end of the hose to keep the gas in the hose from running back, then start again.

When gasoline reaches your mouth, remove the hose quickly and move it to a point lower than the tank the gas is being siphoned out of. In this way the atmospheric pressure in the tank will push fuel out through the hose. To stop the fuel flow, raise the hose end up. As long as the hose remains full you can turn the siphon off and on by raising the hose end up and down.

Another way to get gasoline out of a vehicle tank is to take off or cut the fuel line, open the fill cap, and let fuel run out the cut or disconnected fuel line. This requires some knowledge of auto mechanics, and a vehicle that you can get under. This of course will temporarily disable the vehicle.

Another way is to use a sharp screwdriver, chisel, or knife and punch a hole in the bottom of the tank, then remove the fill cap for venting. A hammer will make this easier, but is not mandatory. This of course will render the vehicle unable to hold fuel until the hole is repaired, which will make it temporarily inoperable. If the vehicle itself is the target, this is a good way to use its fuel.

ALCOHOL

This fuel is inferior to gasoline as an incendiary weapon: it burns less hot and a lot cleaner, and it has a much higher flash point. But if it's all you can find, it's better than nothing. It can often be found in medicine cabinets, where it is used as a cleaner and sterilizer. Its most common form though is as a beverage.

Alcohol is commonly mixed with water, and the percent of the mixture that is alcohol is usually given on the container. In alcoholic beverages the word proof is used instead of percent; two proof equals one percent. To burn, alcohol

Alcohol is not as good a fuel as gasoline, but it will get a fire going. Alcohol is typically mixed with water (and other things), and the percent of alcohol is given on the label; on beverage labels it is often given as proof. The higher the percent, the better the fuel. It has to be at least 50% (which is 100 proof) to burn at all, and that low a concentration doesnít burn very well.

needs to be at least 50%, or 100 proof, and alcohol of that purity will just barely burn.

FUEL OIL

Fuel oil is used in some heaters and other equipment. It is less common than it was years ago, but it is still in use. There is a range of thickness of fuel oil, from number one to number six, with the bigger numbers being heavier. Kerosene is a light fuel oil.

Fuel oil is less volatile than gasoline and so is safer to work with and burns longer. Often it is a superior fuel for an incendiary device.

SOLVENTS

Many solvents, used for cleaning things like oil and paint off tools and thinning paints and varnishes, are highly flammable; some are more volatile than gasoline. Flammable solvents would include benzene, naphtha, toluene, turpentine, and lacquer thinner, among others. Mineral spirits is classified as combustible; it burns very well but is less volatile than the other listed solvents. This means that often it is a better fuel; it's just a little harder to get started.

Some solvents eat some plastics, so they should not be stored or mixed in plastic containers or mixed with plastic utensils. The container should tell whether a solvent is safe with plastics.

Many solvents are flammable. Those shown here run the range from combustible to extremely flammable; read the label to determine how to use them. Usually the best way to store and carry them is in the container they come in, unless you want to carry the fuel concealed. Make sure that whatever you carry them in won't be melted by them.

Solvents tend to give off very nasty fumes even when they're not burning; lacquer thinner is among the worst. Breathing them can give you a bad headache in a short amount of time, and they can produce permanent brain damage. And if the solvent is flammable so are the fumes, so don't smoke around solvents, be careful around electric motors and pilot lights, and don't let fumes build up.

NAPALM

Gasoline can often be improved as an incendiary material by being thickened. The thickening slows down its burning rate so that it burns longer, which greatly increases its chances of starting a secondary fire. The thickening also makes it stickier, so that it will adhere better to the target.

Napalm can run the range from a heavy liquid to a thick jelly or paste. How thick and sticky a fuel should be depends on its application: the thicker the mixture is the more concentrated it will be; the thinner it is, the greater area it will cover. A slow burning rate is almost always an asset. Often napalm is a better fuel for that reason alone, even in a case where a thinner fuel might be better.

The word napalm is made from the words naphthenate and palmitate, two components of an early thickened gasoline mix. That formula never saw much use, but the name stuck, and is now used generically to refer to any thickened petroleum-based fuel with an incendiary purpose. There are many ways it can be made, even by the home chemist. A few will be given here.

Napalm should be considered as volatile as the gasoline or fuel oil it is made with, because the lighter fuel will evaporate out of the mix and catch fire as easily as if it were used as is. The less volatile fuel the gasoline is mixed with though is that much less fuel giving off fumes.

It would seem that any thick fuel could be mixed directly with any thin fuel to get napalm, but that is not the case. A lot of things don't mix very well, and will remain separate or only semi-mixed even if poured into the same container and stirred or shaken. Sometimes though it doesn't matter how well they mix; they'll both get on the target and burn; the lighter fuel will burn quickly, and get the slower fuel burning.

When making napalm, remember that the fumes of liquid fuel are flammable and explosive.

They can also be toxic and intoxicating. This means they can give you a bad headache, make you stupid, and even injure or kill you. Colder temperatures result in less fumes. Any time you have an open container of fuel, make sure you are in a place where fumes will be carried away.

This means outside, preferably with a slight breeze, or in a well-ventilated room, with ventilation engineered to pull fumes out of the room and into the open. Windows on opposite sides of the room and building should be open, and a fan should be set to blow air away from the area you are working instead of sucking fumes out. And the fumes need to be blown outside, not just into another room.

Whenever you work with fuel, have the means to put out a fire just in case you screw up, but don't screw up.

Keep in mind that mixing chemicals can be dangerous for reasons other than the fumes they give off. Sometimes things react violently to each other, like two cats that hate each other. If you're holding them you can get scratched pretty badly. So if you're not sure about the chemicals you have or how they will react together, mix only a very small amount at a time until you know what you are doing. As always, wear eye and face protection whenever working with chemicals; you won't be worth much to the militia if you're blind.

MOTOR OIL

The easiest way to make napalm is usually to simply mix gasoline and motor oil. The two mix well, stick to things well, and burn hot and long. It is the easiest napalm to make, and it is as good as or better than any other napalm you can make for most purposes.

Motor oil is commonly found wherever there is motor fuel. Where the source of fuel is a vehicle fuel tank, there is likely to be a tank of oil as well somewhere on the same vehicle, and a means to drain it, or there might be a bottle of oil close by (especially if the vehicle is a Dodge). If you drain the oil out of the crankcase of a car owned by an idiot, there might not be much oil, the oil might not be in very good shape, and it will probably have quite a few metal shavings in it.

Usually the gas/oil mix is 50/50, but the ratio can be adjusted according to what is available and how thick and slow-burning you want your napalm to be. The weight of oil is usually

The best napalm mix for most purposes is a mix of gasoline and motor oil. The two components are very available and inexpensive. They mix readily and burn very well, giving off smoke and carbon monoxide; oil is sticky.

given on its container; the higher the number, the heavier the oil. A high ambient temperature means you should use more and heavier oil; a low ambient temperature means you should use less and lighter oil. This of course is simply fine tuning; any motor oil will do, and any mix will start a fire.

SOAP

True soap is made from animal fat or vegetable oil and a small amount of lye. These days it usually has other things mixed in with it. Since fats and oils burn well, soap mixed with gasoline will also burn well, and the soap will thicken the gasoline and make it stick to things. The mix you get from new soaps though will probably not be very good; use oil instead if you can get it, or make your own soap.

Many things that appear to be soap are actually detergents; these are of no use for making napalm. If the word soap does not appear on the label, it is probably detergent, not soap. Soft soaps, such as dish-washing liquid and soft hand soap, have so much water mixed in with them that they are of no use. Bar soap is the kind to use; powdered soap, used in some dispensers, is easier to use but harder to find.

It used to be common for people to make their own soap, out of animal fat and lye, and such soap works well for napalm. Recipes for soap can be found in books on early American crafts.

If bar soap is used, it needs to be cut or shaved into small pieces. This can be done easily with a sharp thin knife. A kitchen grater, like the type commonly used to shred carrots for salads, works very well.

If you have access to both, use a mix of half gasoline and half fuel oil. Diesel, kerosene, turpentine, benzene, or toluene can also be used, instead of or in addition to gasoline.

The fuel and soap need to be heated together. Heating volatile fuel is dangerous, because the heat will greatly increase the evaporation rate, and the source of heat might ignite the fumes, leading to fire or explosion. So it should be done outside or in a very well-ventilated area.

One way to heat the fuel is with a double boiler. Boil water in the lower part of the boiler, then remove it at least several feet away from the heat source and set the top part of the boiler onto it. If you don't have a double boiler, you can do essentially the same thing by boiling water in one pot and then setting a smaller pot of water into it.

Another way is to simply fill a kitchen sink with hot tap water. It might be necessary to turn up the water heater, but the water will probably be hot enough to melt soap without any adjustment.

Gasoline can be heated directly, but it is dangerous. If you do this and the fuel catches fire, put a lid on it or cover it with a flat board. Don't throw water on it.

The ratio of fuel to soap given in an army technical manual is 50/50; the thickness of the napalm can be adjusted by changing that ratio. The 50/50 mix will give it a consistency of jam, which is too thick for some applications. A 3.5 ounce bar of soap will turn a quart of gasoline into thick jelly.

Boil the water in the lower half of the doubleboiler. Remove the pot at least several feet from the heat source. Set the top pot over the hot water, add the soap flakes to it, and mix the gasoline in with the soap. Stir the mixture until it thickens.

If it doesn't get thick after about fifteen minutes of stirring, remove the upper pot and set it well away from the heat source, and reheat the water in the lower pot, then put them together again and stir some more, until it gets thick.

The napalm is ready for use at this point. If you let it set for awhile it will set up, its thickness depending on the mix ratio. It will keep well for months in a sealed container.

To make the same thing without using heat, mix a small amount of alcohol in with the gasoline. The alcohol can be ethyl (i.e., booze), wood, or isopropyl. The ratio of components given in a special forces manual is 36 parts by volume gasoline, one part alcohol, and 20 - 28 parts soap. Simply stir the components together until they get thick. If the soap doesn't dissolve, you have to heat it.

WAX

Melted wax can be used to thicken gasoline. Wax for things like candle-making can be bought at grocery and K-mart stores where food-canning supplies are sold; it should also be available at hardware and hobby stores. It is also found in the form of candles, crayons, shoe-shine paste, and bee honeycombs.

The ratio is 20 - 40 parts wax to 60 - 80 parts gasoline. Begin with less wax, and add more until you get the desired thickness.

Fill a pot with hot water. Melt the wax, and pour it into a jar or other container, and set that container into the pot of hot water; the hot water will keep the wax from solidifying quickly. Make sure the water level in the pot is low enough that no water spills into the jar of wax. Add the gasoline slowly and carefully to the melted wax. The two should mix on their own; let the mix cool slowly, immersed in the water bath

If the mix does not gel, add more wax, up to 40%. If that doesn't work, add a small amount (one-half percent by volume) of lye dissolved in an equal amount of water to the mix, put the cap on the container, and shake it until the mixture gels.

Lye is very caustic, and must be handled carefully. Double the amount of Drano can be used instead of lye.

HOW TO MAKE LYE

It used to be common for people to make their own lye. It is done by letting water run slowly through a large mass of wood ashes. A hole is drilled at or close to the bottom edge of a large tub or barrel. This vessel is set on blocks, so that a smaller vessel can be set below the drain hole to catch the lye solution; the vessel setting on blocks is tilted slightly so that the drain hole is at

its lowest point. Line the bottom of the large vessel with straw to filter solid particles out of the lye solution. Then fill the vessel with wood ashes, and scoop out a hole in the center big enough to hold a few quarts of water.

Heat a few quarts of distilled or rain water to boiling, and pour it into the hole. When the hole is empty, add more hot water. Depending on how tightly-packed the ashes are, it might take as long as several days for the water to seep through the ashes and out the hole. The solution that comes out of the hole is a mixture of lye and water (and some impurities); the ratio of lye to water can be increased by boiling, even to the point that there is no water left.

ANIMAL FAT

The fat that cooks out of hamburger and bacon is thick, sticky, and flammable. At typical room temperatures it is a semisolid, like butter, which is another form of animal fat. At higher temperatures fat melts into a greasy liquid that adheres very well.

If it is mixed with gasoline, fat will not set up, and so will remain more or less liquid, depending on the mix. It doesn't mix as well with gasoline as other thickeners, but if nothing better is available, it might still be better than straight gasoline. Fat is probably better though mixed with solid fuel like paper, as explained above.

It is not essential that the grease be cooled as described below, but if it is not cooled, some of the mass will be non-burning. This substance will not keep the grease from burning; it just fills space that would otherwise be filled with fuel. There might be a little or a lot, so cool it and let it separate out if you have time.

Pour pan drippings from bacon, ground pork, chicken, or hamburger into a bowl and leave it until it hardens; it will harden much more quickly in a refrigerator than at room temperature. After the grease hardens, remove the solid mass from the bowl. There will be a jellylike substance at the bottom; remove and throw it away.

After this nonflammable substance has been removed, the grease is melted, in a pan, microwave, or by setting it in the hot sun. The melted grease is then mixed with gasoline, at a ratio determined by whether you want more volatile fuel or more slower-burning fuel in the mix.

A hard mass of grease can be used more or less as is, but it will work much better if it is melted and mixed with gasoline, or absorbent solid fuel such as paper, sawdust, or cloth. Grease will soften at typical room temperatures, and adhere very well to surfaces, melted or not. As the grease takes fire the mass will liquefy very quickly, and carry the fire downward as it flows, soaking into porous surfaces. It is a little harder to get it burning without an accelerant mixed in, but once it starts it will usually take care of itself.

An army manual gives a recipe for a napalm mix similar to straight gasoline and fat but improved, using in addition to fat the other component of soap, lye, to make the fat set and mix better. It contains 60 parts by volume gasoline, one part lye powder (or two parts lye flakes or Drano), 3 parts ethyl alcohol, and 14 parts animal fat. Instead of fat you can use double the amount of vegetable oil, or the same amount of fish oil; twice the amount of lye also needs to be used.

Begin by pouring the gasoline into a non-aluminum container. Pour the melted fat in and stir until it mixes. Add in the alcohol.

Mix the lye in a separate non-aluminum container with an equal amount of water. Be very careful that you don't get any lye on yourself or your clothing; if you do, wash it off right away very thoroughly and rinse it with a lot of water.

Pour the lye into the gasoline and stir it in. Stir it every so often until the mixture sets up; this should take around a half hour, according to the recipe.

Within a few days this napalm will develop the consistency of a firm paste. It can be used in that form, or thinned by stirring in more gasoline.

STYROFOAM: NAPALM-B

A Vietnam era incendiary mix used by the military is called napalm-B. This fuel is reputed to stick better and burn longer than earlier napalms. As evidence of its effectiveness, a company that made it for use in the Vietnam War, Dow Chemical, was selected for special attention by American traitors for doing such a good job of giving American soldiers the ability to kill communists. The homemade version is very sticky, but otherwise is probably no better than any other napalm. It is a worthwhile mix though if you have the right materials.

Improvised napalm B should be popular with environmentalists, because making even small

quantities of it causes a very quick decomposition of a large mass of Styrofoam into a tiny semi-liquid mass that mixes with fuel; burning then completes the process, except for a tiny bit of residue. This will help keep Styrofoam from eating up precious space in landfills. So homemade napalm B should be among the most politically correct of all napalms. But no napalm will ever be popular with the PC crowd (unless it's used against patriots).

Napalm-B is made from a mixture of 25% gasoline, 25% benzene or toluene, and 50% polystyrene. Those three things are common: benzene and toluene are used as solvents; polystyrene, better known as Styrofoam, is used for packaging many products, holding hot and cold drinks, electronic components, and a number of other things.

Either the solvent or the gasoline will melt Styrofoam by themselves, but if the military mixes them together it is probably a good idea.

Make sure you are in a well-ventilated area. In a non-plastic container (i.e., glass jar, bowl, etc.), mix together equal portions of gasoline and benzene or toluene. Then break up Styrofoam into pieces, and put them into the mix; they will melt down on their own and mix with the fuel. Keep adding more until they won't dissolve any more. Since Styrofoam is mostly air, you will have to add in a lot.

At this point the mixture is ready to use. It will be a thick, syrupy liquid, not a paste or jelly.

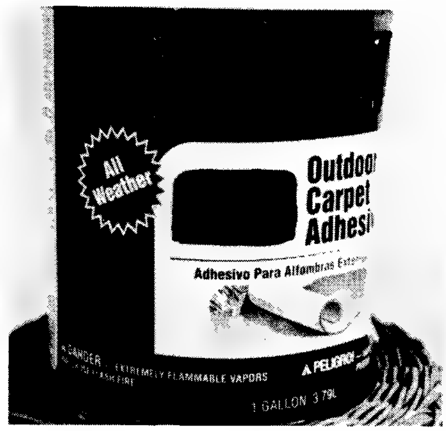
POLYURETHANE AND VARNISH

Thick liquids used to put a tough shell on woodwork and wood furniture are often flammable. Anyone who has ever worked with them knows that they are among the stickiest substances known to man. This means they can be used as napalm as is. Not all polyurethanes and varnishes are flammable, so you need to read the label to be sure. The flammable part is the solvent that the coating is dissolved in; after that part of the mix has burned, the rest will go out on its own.

They can be used as is, or mixed with a flammable solvent or gasoline. Once they are dispersed onto a target they will begin drying immediately, so they need to be lit right away; the longer they stay in the open the less power they will have.

GLUE

Some glues are labeled extremely flammable. Being glue, they are typically thick and very sticky. Like polyurethane, it is the solvent that keeps them soft that burns, so not all of the mass is fuel. They can be mixed with flammable solvents, or used as is. Even though they are thick they can be very volatile, which makes them dangerous to work with.



Some glue has highly flammable vapors. It sticks to things well (because it's glue) and burns. The glue itself doesn't usually burn though, so only part of the substance is fuel (the part that evaporates).

ENRICHING NAPALM WITH SOLID FUEL

A number of solid fuels have been added to napalm by the military to alter its characteristics. Sometimes white phosphorous is added as an igniter, and to make the mix burn more aggressively. Thermite and other metal powders have been mixed in to add their qualities to the weapon. Asphalt, sawdust, lamp black, and certain resins have been mixed in to increase the amount of time the fuel burns.

An army manual on incendiary weapons recommends adding several pieces of charcoal to a napalm mix, saying, "the heat output is considerably increased." Extending burn time increases the probability of starting secondary fires, and adding solid fuels will have that effect.

A Molotov cocktail used against personnel is probably best mixed with well divided solid fuel, such as gravel- or powder-size pieces, or kept pure liquid. But if you don't have enough liquid

TABLE 4

CHARACTERISTICS OF FLAMMABLE GASSES

Name		Flammability Limits % by volume in air		Relative Weight
Gas	**Btu/cu. ft.**	**Lower**	**Upper**	**(Air = 1)**
Acetylene	1499	2.5	81	.91
Anhydrous Ammonia	386	16	25	.6
Butane	3300	1.9	8.5	2
Carbon Monoxide	314	12.5	74	.97
Hydrogen	325	4	75	.07
Natural Gas	958 - 1124	4.6	14.5	.6 - .7
Propane	2516	2.1	9.6	1.5

fuel to fill your jar, you might as well add whatever solid fuel you can find. This might be sawdust or broken up charcoal or wadded up paper or something like plastic bags; there are many possibilities.

GASEOUS FUEL

Fuel in a gaseous state mixes with air as soon as it is released into the atmosphere, and so burns readily, usually more or less all at once, often causing an explosion. Since no pyrolysis is necessary, things happen quickly. The good air/fuel mix allows combustion to take place all at once; this is good if an explosion is what you want, and if fire is what you want, the explosion usually starts a fire.

The book *Practical Fire and Arson Investigation* has this to say about the use of flammable gas in arson, "...the 'torch' is either one of two extremes, highly skilled or blatantly amateurish. The unpredictability of gaseous fuels and the inherent danger associated with their use virtually preclude their use by professional torches... A torch's intent is to destroy a building, not risk his life." Amen to that.

This book is written for situations desperate enough that risks are justified. In such a case, it is essential that the fireman be highly skilled. So study the subject on paper before you are in a situation where you might have to use the device. Have a plan; things have to be done in the right order. Put out all sources of ignition, and use a timer, boobytrap, or remote to initiate fire. Beginning the release of gas is as close as you can make it to the last thing you do before you leave.

Gasses for hot water and heat are piped into most buildings designed for human use; anything that doesn't have hot water and heat (except in warm climates) is probably a shed, not a building. Some buildings are all electric, but most use at least some gas. This makes natural gas and its cousin LP gas even better distributed than the gasoline that fuels our cars. So this powerful weapon is often accessible, to one who knows it.

Some gasses are compressed into a liquid state for storage and transportation, but as soon as the valve on their container is opened, they will regain their gaseous condition as fast as the valve will allow. These liquified gasses are far more concentrated, and so more dangerous, than compressed gasses.

Some liquified gasses are also cooled so that they behave as a liquid, until they warm up; gasses stored in this manner are called cryogenic. These have an ever increasing vapor pressure, and so are carried and stored with vents open. These gasses have the added danger that if they escape as a liquid they can freeze whatever they contact.

Unlike the vapors of flammable liquids, most flammable gasses are lighter than air (propane and butane are exceptions). The measure of the weight of a gas is given as a quantity called specific gravity. The specific gravity of air is one, so a gas with a weight greater than one will fall to the floor and build up. If the weight is less than one, the gas will float up and diffuse out or build down if there is enough of a seal to hold it. Usually it is a combination. The weight of a gas and tightness of a building determines where the best places are to set the source of ignition.

Gasses are not only more flammable than liquids, their expansion is also influenced to a greater extent by heat. All matter expands when it gets hot, but gasses expand a great deal more than other matter. The volume of a gas doubles when its temperature doubles (this is known as Charles' Law, after the scientist who discovered it).

This expansion in volume due to heat can lead to pressure explosion whenever heated gasses are confined. For example, a large gas leak inside a building burns and suddenly heats the air. This causes the air, which is a gas, to expand. Since the building limits space and there is suddenly a far greater volume of gas than there is room for, something has to give, and the thing that gives is usually the building.

Gasses stored in containers are also subject to expansion from heat, and the expansion can cause the container to rupture, usually with substantial force, followed by sudden escape of the gas. If the gas is flammable, it will burn; if the burning is fast enough (which is usually the case) and confined enough it will explode. Such an explosion can be pretty big.

The size of the explosion is determined largely by the amount of liquid that turns to vapor when the container ruptures. Most explosions of this type occur in containers that are from a little less than half to around three-quarters full of liquid. These explosions have killed people to a range of 800 feet.

To guard against this, gas containers are usually fitted with release valves, so that if the gas expands to a dangerous level, the valve will release enough to keep the bottle from rupturing. If there is a source of ignition, the released gas will burn. Some containers are insulated.

All flammable gasses have an upper and lower limit of flammability. A mixture too rich or too lean will not burn. The closer a mix is to the middle between the upper and lower limit, the more powerful the explosion will be. This mixture range must be easy to arrive at as often as it happens accidentally. These upper and lower limits are given in Table 3-3. Note that some gasses have a wide range, while others have a narrow range. The wider the range, the easier the gas is to work with.

All common gasses generate roughly the same amount of pressure when they explode. Toward the upper and lower limit of flammability, they typically generate twenty to twenty-five pounds per square inch (psi). At mid-range, which is the optimum mix, they generate one-hundred to one-hundred fifteen psi. Typical buildings are able to withstand pressures of no greater than one psi.

Some gasses are odorless. To reduce the danger from accidental leaks, odorizers are usually mixed with these gasses. Codes typically specify that such gasses be detectable to a person with a normal sense of smell when they reach a level one-fifth their lower limit of flammability.

The way to make maximum use of gaseous fuels in the destruction of buildings is to make the building or part of it as airtight as possible, to contain the gas as it builds up. Calculate the total volume of air that the gas will pour into, and determine from that what amount of fuel will have to be piped into that volume of air to be within the limits of flammability. If you know or can estimate the volume of gas per unit of time being released into the air, you can determine the optimum delay before ignition.

This of course is a difficult series of calculations, and there are factors that cannot be known for certain, such as to what extent the gas will diffuse out of the building. For most people, the use of gas as an incendiary/explosive weapon will involve a great deal of guesswork. This can be dangerous to the fireman, who needs to be sure he is out of the building before the lower limit of flammability is reached. Even though he might be counting on a timing device to initiate fire after he is long gone, the gas might be ignited prematurely, by a pilot light he forgot to put out, or even a spark from static electricity or an incoming phone call.

There are a number of flammable gasses of interest to the fireman. They will be covered in detail below. The containers used to transport and store these gasses are required by law to be labeled. So they are easy to identify.

ACETYLENE

This gas is commonly used as the fuel of cutting torches. It is usually stored in bottles. It can be found in most industrial areas, such as shops, factories, power plants, and oil refineries, where torches are often used in maintenance, and wherever construction with steel is being done. Welding supply stores often have a lot of it on hand, along with the means to produce it. Usually wherever you find bottles of acetylene you will also find bottles of oxygen, which will greatly expand the burning and explosive characteristics of the fuel.

Boilermakers and other workers who routinely use acetylene torches sometimes make firecrackers with acetylene and oxygen. This is done by first lighting the torch and setting it to make a cut. This means there is an optimal mix of air and fuel. Then the torch is put out by hitting the tip against something such as steel or a leather glove (it doesn't take much to put out a torch in this manner; often it happens accidentally).

The gas mixture coming out of the tip is then used to fill a sandwich bag, which is then usually tied shut. This oxyacetylene bag is then ignited, either directly or by doing something like lying it under somebody who is welding, so that a spark from welding will burn through the plastic. When ignition occurs, the mix goes off like a big firecracker. It has a lot of power for a little sandwich bag full what looks like air.

I have heard of boilermakers working in the firebox of a power plant filling trash bags with this air/fuel mix. To ignite the mix safely, they cut the female end off an extension cord, stripped the wires, twisted them together, and put that end of the cord into the trash bag. The bag is then taped shut with duct tape. The bag is thrown out into the firebox, and the cord is plugged in. They say that the resulting explosion rocks the whole boiler, which means it is a pretty big explosion.

As you will see in Table 3-3, acetylene has a very wide range of flammable limits. This makes it a relatively easy gas to work with. The availability of oxygen makes it even easier.

Since acetylene is so dangerous, the bottles it is stored in are made very safe. The bottles are filled with a porous substance, and the gas fills the pores. In this way the gas is divided into relatively small amounts. This reduces the risk from heating and impact. Acetylene bottles also have pressure relief valves. Usually they are of the type that melt rather than the spring-loaded type. So once they open, they stay open.

Acetylene is made by mixing calcium carbide with large amounts of water; both stationary and portable generators for it are made. Calcium carbide, which generates large volumes of the gas when immersed in water, can be bought from welding supply stores.

Acetylene is nontoxic. By itself it does not have an odor, but it contains impurities that give it a characteristic odor. It is compressed, not liquefied.

ANHYDROUS AMMONIA

What is usually thought of as ammonia is a mixture of ammonia and water; the word anhydrous simply means without water. It is made up of nitrogen and hydrogen. The latter is very flammable but the nitrogen is nonflammable; the mix is flammable, but less so than more pure fuels.

Anhydrous ammonia is used as a fertilizer and a refrigerant. It is common in farming areas. It is shipped by trucks, railroad tankers, and barges; it is stored in cylindrical tanks. Since the gas is toxic, tanks stored indoors are unlikely to have a pressure release valve. Some tanks are insulated.

This gas has a limited flammability range, but within its limits, it will burn and explode. It is carried and stored in a liquid state; sometimes it is a cryogenic.

HYDROGEN

This gas is used in the production of oils for food (i.e., soybean refineries), some gas welding, the manufacture of ammonia, and the manufacture of synthetic petroleum from coal, among other things. It has in the past been used to carry lighter-than-air craft (i.e., the Hindenburg). It has an extremely wide flammability range, and in the right mix is very explosive. It is colorless, tasteless, and odorless. It is nontoxic.

Hydrogen is so flammable that when released at high pressure, it will take fire so readily as to be considered self-igniting. For this reason it usually burns before enough has accumulated to cause an explosion. When released at lower pressures though it usually builds up, and when ignited produces a big explosion.

Tanks used to carry and store hydrogen have pressure relief valves. Often the tanks are insulated. The gas is compressed, not liquefied.

Since hydrogen is so light weight, it is even more likely than other gasses to diffuse out of a building rather than build up to an explosive level. As with all gasses, it depends on how weatherproof the building is.

LIQUEFIED NATURAL GAS (LNG)

This is a mixture of mostly methane with small amounts of butane, ethane, and propane. As the name implies, it is natural gas compressed and chilled to become a liquid. It is used in the same way natural gas is used, often as a supplement for home heating during peak periods of use. It is nontoxic, but can be an asphyxiant.

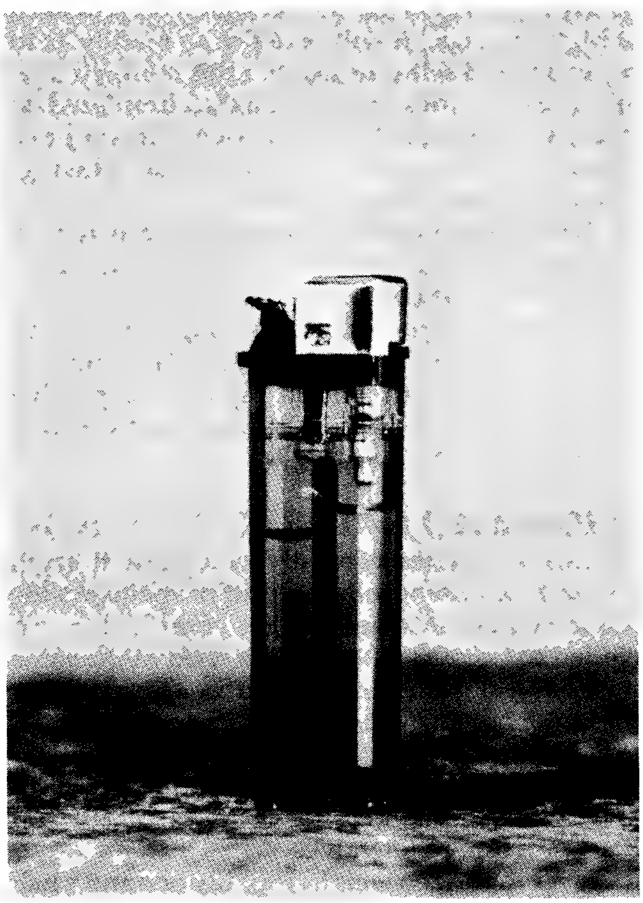
LNG is stored and carried in a liquefied, cryogenic state. Containers for it are insulated and have pressure relief valves.

LNG vaporized weighs roughly one and a half times as much as air, so when it escapes from its cryogenic tank it falls to the ground and spreads out like a mass of thick liquid. This mass can be seen by the water vapor that condenses around it, making it look like a fog. This fog and usually areas close to it can be ignited.

LIQUEFIED PETROLEUM (LP GAS): PROPANE AND BUTANE

This is a mixture of predominantly propane or butane (or both) and small amounts of ethane and a few other gasses. It is often referred to as bottled gas. It is used in heating where gas has to be delivered by truck instead of being piped in, and it is used with recreational vehicles and sometimes as a motor fuel. It is nontoxic, but it can displace enough air to cause death by asphyxia.

LP gas is carried and stored in a liquefied state; sometimes it is cryogenic. It can be found in big tanks outside of houses where there is no piped-in gas service (i.e., rural areas), and is commonly found in small, easy-to-carry bottles used with



This cigarette lighter with see-through walls is a tank full of gaseous fuel (butane) carried concentrated in a liquid state. This concentration allows a big mass of fuel to be carried in a small package.

travel trailers and barbecue grills. Even a small bottle of this gas in a liquid state is very dangerous; one gallon of liquid will grow into roughly 260 gallons of vapor.

Like LNG, LP gas is heavier than air (one-and-a-half to two times the weight), so when it is released from its container it will fall and spread along the ground, made visible by a cloud of condensed water vapor. Ignition can occur even outside of this cloud.

LP gas is subject to tank failure and pressure explosions if subjected to external heating. Containers have pressure relief valves.

Butane is a very important gas to the arsonist because it is the fuel used in state-of-the-art fire-initiators. A small device that fits easily in a pocket carries enough gas to start thousands of fires.

NATURAL GAS

This is the gas piped into buildings for heating, cooking, hot water, and other appliances. It is made up mostly of methane, with a small amount of ethane and a few other trace gasses. During periods of peak usage it is sometimes supplemented with LP gas. It is nontoxic, but can kill by asphyxia.

Natural gas is carried and stored throughout North America in a million-mile network of pipes, running from production facilities to cities and ultimately through so-called mains and into buildings. In the big pipes it can be at a pressure of a thousand psi; in the smaller pipes it is usually at a pressure ranging from a quarter to sixty psi.

Natural gas is lighter than air, so when it is released it floats upward. If a building is not very weather-tight, the gas can diffuse out of it and never reach its flammability limit. Since natural gas is typically odorized, people in or around the building will be aware of the leak. Sometimes the odorizer in gas escaping from underground is filtered out by the dirt as the gas floats through it like water in reverse.

Natural gas is released into a building by opening the piping system that carries it in. This can be as simple as turning on a gas stove after blowing out the pilot lights (don't forget the one in the oven). Where there is no gas stove, or you want gas released from a different point, the piping can be taken apart. The easiest way to find gas pipes is usually to find the furnace or hot water heater, which will have gas lines feeding them if they are gas fed.

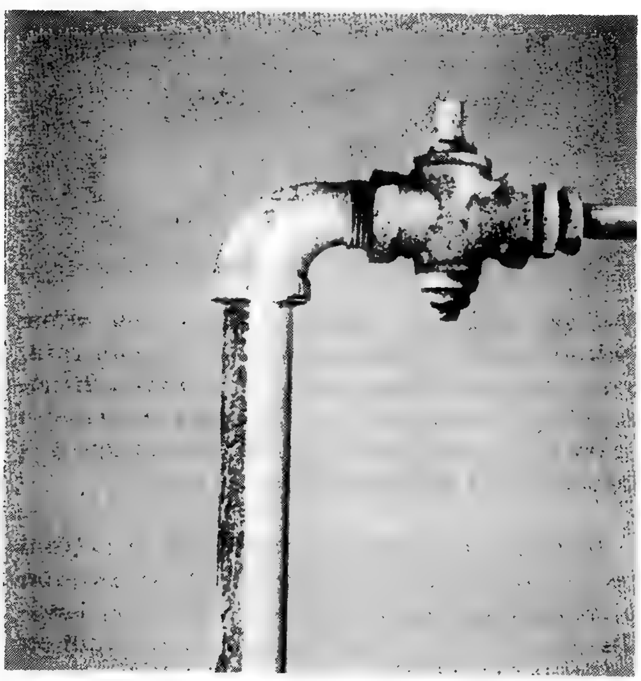
Before opening the gas line, follow the pipe until you find a valve, and shut it off. Make sure the valve is between the part you intend to take apart and the gas supply. Make turning the gas back on as close as you can to the last thing you do before you leave. Any gas between the valve and the point you break into in the line will leak out when you open the line. If there is very much of it, vent it out, unless you will be leaving right away.

If there is no valve, one of the last things you do before you leave is open the line. This takes longer than opening a valve, and so is a more dangerous method.

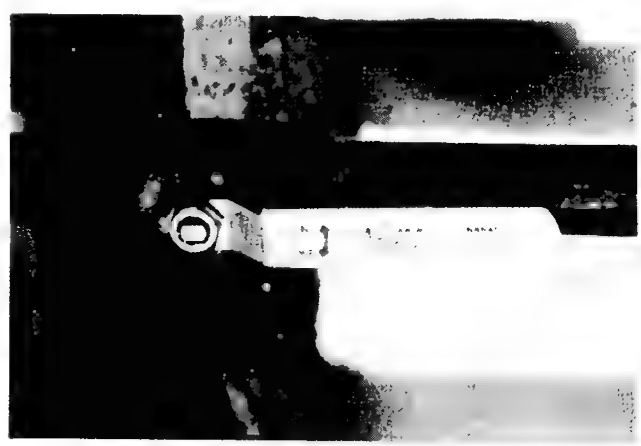
Usually gas pipe is one-inch steel pipe that looks like steel plumbing pipe. It can be taken

Gas valves are often found close to connectors, though not always this close. Turn the valve off before you disconnect the fitting; turn it on just before you leave. Make sure to disconnect the line on the feed side of the valve; to know which side the gas comes from you can follow one of the lines to see where it goes. It isn't always as obvious as in this picture.

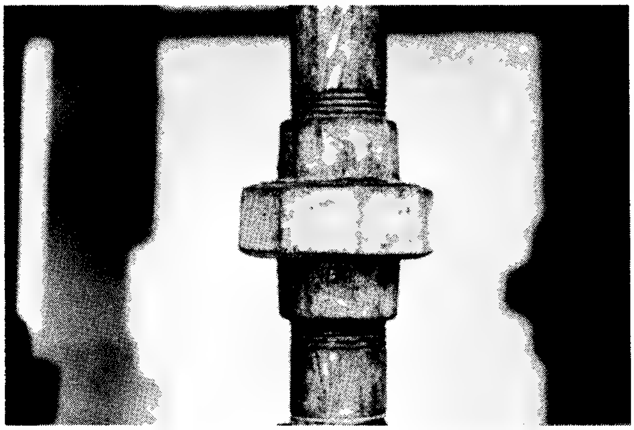
When the valve handle is parallel to the gas line, as in this picture, the valve is on. The hole in the handle is for a screwdriver or similar tool to be inserted through it to make the valve easier to turn. A wrench or pliers can also be used.



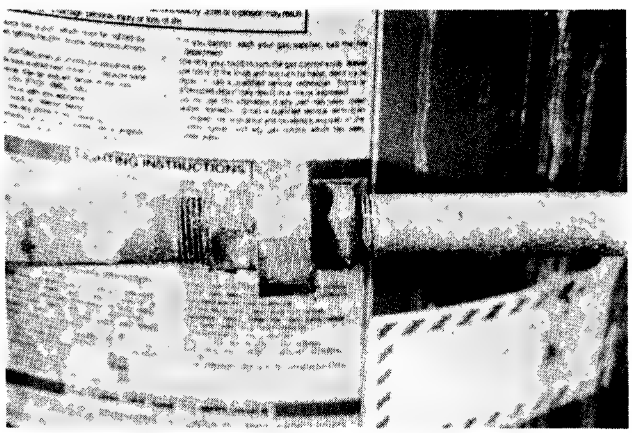
This gas valve is between an elbow and a reducer. When the part of the valve you turn is perpendicular to the gas line, as in this picture, the valve is off.



Some gas line valves can be operated without a tool. On this one on and off are marked. As always, the valve handle running parallel to the gas pipe indicates that the valve is on.



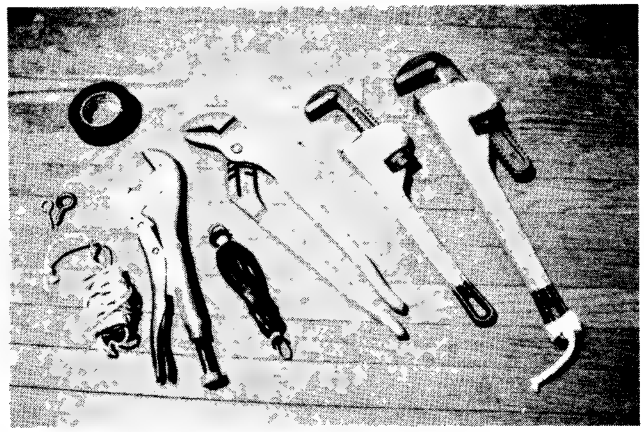
Typical steel gas pipe union; this is usually the point at which it is easiest to break into a gas line, with a large pipe or other adjustable wrench.



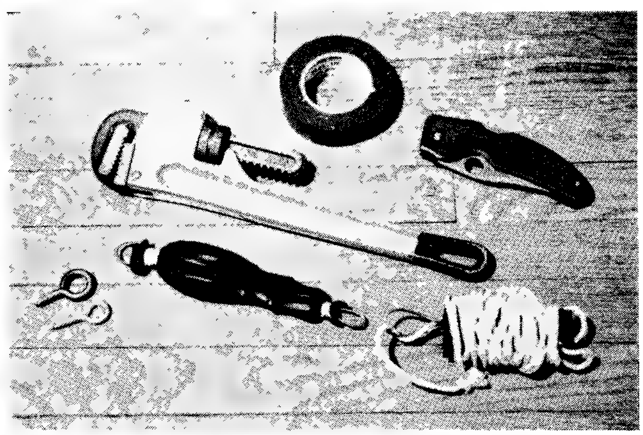
Often the easiest way to find a gas line is to find a water-heater; if it is a gas heater it will have a gas line running to it. Simply follow the line until you find a union (it's usually pretty close, as in this picture); there should be a valve nearby.

apart or just loosened with a pipe wrench. The easiest places to take gas pipes apart at are the points called unions. These look like a big nut surrounding the pipe. There should be one close to every gas appliance, and also where the gas comes into the building.

Natural gas leaks are often ignited by pilot lights. These are found on all gas appliances, including furnaces, hot water heaters, stoves, gas clothes dryers, and even gas air conditioners. Usually a gas stove will have two pilot lights, one for the stove and one for the oven. Before opening a gas line, put out all pilot lights, unless you intend to use them as your source of ignition.



If there is a gas stove in a building you don't need any special tools to break into the gas line; otherwise, you probably need something like a pipe wrench. If your grip is strong enough you can get by with big water pump pliers. These tools can also be used to defeat some locks, simply by turning the door knob real hard. Some gas lines can be opened with locking pliers.



With gas as fuel you need a way to get out before ignition occurs; matchbook igniters, nylon cord, screw eyes, and tape allow you to make a timer, boobytrap, or remote trigger. The pipe wrench is also a very good close-quarters weapon, and though it is not silent, it is far less noisy than a gun.

Methane, the primary ingredient of natural gas, is a product of decomposition. In addition to conventional sources, it is produced by landfills. Sometimes it leaks into basements built on old buried landfills.

A fire or explosion caused by a gas pipe being taken apart will not look like an accident; such pipes do not come apart on their own. Gas pipes

do accidentally crack sometimes, especially where sections are threaded together. This is usually caused by the fitting getting hit real hard or having a lot of weight piled on it. Gas appliances that are not working right or have been installed incorrectly can also leak.

In any such case, the arson investigator will look for fresh tool marks. If you want to keep him from finding any, wrap a softener, such as a piece of leather, around anything you use a pipe wrench or other tool on. No tool marks won't make him think it wasn't arson though.

CARBON MONOXIDE

Besides being very lethal as a poison gas, carbon monoxide (CO) is also flammable and explosive. A product of incomplete combustion due to insufficient oxygen, carbon monoxide floats to other, unburning parts of a building, where it is sometimes ignited by sparks, pilot lights, and other things. This is one means by which fires spread. The gas can also build up in the chamber that produces it by inhibiting air transfer, and explode when oxygen suddenly reaches it, as when a door is opened.

Unlike factory-made flammable gasses, carbon monoxide is not odorized. It is undetectable to the senses, as invisible as an assassin can be. The combination of this and an incendiary capability combined with its mind-numbing and asphyxiating capabilities make it an especially destructive weapon.

There are other flammable gasses given off by such fires. One example is benzene, given off by PVC, polystyrene, and urethane. Like CO, benzene is intoxicating and can be lethal. Phthalates, given off by nonrigid PVC, such as vinyl clothing and upholstery, are also flammable and poisonous.


FLAMMABLE

Chapter Three

Oxygen

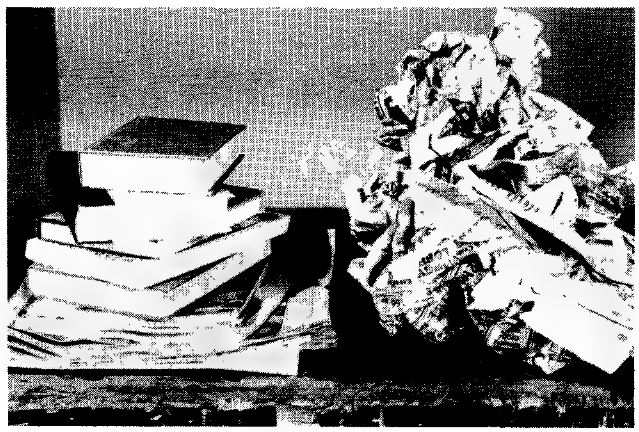
Combustion involves oxidation, that is, the act of a substance (i.e., fuel) mixing with oxygen. So without oxygen, combustion cannot occur. Atmospheric air is twenty-one percent oxygen. This is enough oxygen to allow combustion to take place, but combustion with only atmospheric air to supply oxygen is inefficient, and typically incomplete. It is usually efficient and complete enough though that a fire will carry out its mission without any oxygen being added.

Fire scientists will point out that in certain cases combustion can occur in an atmosphere where there is no free oxygen. These are the proverbial exceptions that prove the rule. According to *Fire Protection Handbook*, given the right circumstances, organic fuels (i.e., wood, oil, etc.) may burn in an atmosphere of chlorine, or zirconium dust can be ignited in pure carbon dioxide.

Since fuel has to be in contact with air to burn, the more of it that is in contact with air or an oxidizer, the more of it will burn. Dividing fuel into smaller pieces and setting it where it is in as much contact as possible with air is the way to get the most complete combustion.

In an enclosed space, a fire can quickly use up all the oxygen available in the air, and become a pile of smoldering embers living on whatever it can suck through small openings in the structure. If no such openings exist, the fire will eventually die; its heat will remain in the chamber for some time, depending on how well insulated the chamber is.

Inefficient burning due to lack of oxygen is not necessarily a bad thing for a fireman, because it can greatly increase the lethality of a fire. This is because incomplete combustion produces poisonous, explosive gasses like carbon monoxide, as well as smoke, which makes escape extremely difficult, by blinding its victims, as it fills their lungs with soot and asphyxiates them (if the carbon monoxide hasn't already done so). Where a fire has used up all the oxygen, there is none left for humans to breathe. So where people are the target of an incendiary attack, inefficient burning due to lack of oxygen is usually a good thing.



There is a great deal more fuel on the left than on the right, but the pile on the right will produce a much better fire, because there is so much more surface area in contact with oxygen. This principle applies to all fuel.

This though does not usually apply to the opening phases of the fire, where it might be necessary to get the fire off to a good start quickly. It all depends on the intended outcome. Cigarettes smoldering on upholstery have killed more

people than raging infernos; both are powerful weapons to be wielded by the fireman, each in its own way.

Where destruction of materiel is the purpose of a fire, the fireman should make sure that the fire will have enough oxygen to complete its mission. In buildings this usually means breaking out windows, opening doors, and turning on exhaust fans, though you need to be sure that you don't let too much heat escape, especially during the opening phases of the fire. Once the fire is big and hot enough, it will break out windows on its own.

A chimney mechanism, such as this laundry chute, will make a fire grow bigger faster by drawing air through it. The upper doors of the chute should be open for good air flow. In this fire set, a quartz light has crumpled paper piled on it; over the paper is piled wadded-up clothing and a plastic laundry basket. More will be added, in and around the chute.

Outside, you increase air to the fire by using wind and natural air currents. Use the wind to carry the fire where you want it; move upwind of your enemy and start fires (and hope the wind doesn't change direction).

A staircase makes a good chimney. This one has been packed with fuel; at the top is a device (covered in Chapter 6) that will pour burning liquid fuel down over all of it; plastic is set over paper and wood. The chimney draft will get a big fire going quickly. All interior doors should be open.

TUNNELS AND CHIMNEYS

A fire will naturally draw air into itself, and there are ways to improve this process. Two mechanisms that can be used to this effect are the tunnel and the chimney.

Large masses of air trading places sometimes force air at increased velocities through small openings. Sometimes these openings have depth, as in a tunnel. Corridors between buildings and

big buildings with outside doors open can have the same effect.

Fire naturally burns up, drawing air in at its base. A chamber that channels air flow to coincide with fire's natural pattern will improve a fire's efficiency, so a vertical tunnel, known as a chimney, does this very well. Staircases, laundry and garbage chutes, elevator shafts, and other walled penetrations between floors are built-in chimneys that often help a fire grow and spread quickly.

AIR MOVING SYSTEMS

Heating, air conditioning, and ventilating systems move air in a building, and so are able to bring fresh air to and carry smoke away from a fire, usually to another part of the building. Central heating and air-conditioning systems recirculate the air inside a building, but do not exchange the air with outside air.

A system that blows air out, such as a window air conditioner, exchanges at least some air between the inside and outside. Exhaust fans can carry a lot of smoke out; they are sometimes used by fire-fighters for that purpose, to reduce the dangers posed by smoke, even though they cause the fire to get bigger (until the men rush in and put it out).

Whether or not there is an exchange of air between the inside and outside of a building, circulation of air within the building will allow the fire to use whatever oxygen is available in the building even if interior doors are closed.

If fire is set close to one or more intake manifolds of an air-moving unit, the unit will draw smoke away from the fire and distribute it throughout the building. As smoke is drawn away from the fire, relatively clean air flows in to replace it, so the effect is to fan the fire, helping it grow bigger faster. The distribution of smoke and poison gas throughout the building will attack the building's inhabitants. So it's a good place for a big pile of smoldering rags and or burning plastic, rubber (i.e., tires) and so on.

The return air duct can be broken into anywhere you can get to it; it is usually easiest to find and identify close to the fan. The return air or intake manifold of a central air conditioning system will usually be a grill that is substantially bigger than the outlet registers. Study home-improvement books on heating and air conditioning to know what to look for.

Buildings often have mechanisms to shut down internal air-moving systems in the event of fire. One common type is a smoke detector that attaches to the outside of the duct, usually close to the fan, with long sensors extending into the duct. If the sensors detect smoke, they will shut down the fan. Ducts also commonly have dampers that close when they detect smoke. These can be defeated.

An attic fan can move a lot of smoke out of a building, sucking in fresh air behind it. This type of fan will also pull heat out of the building.

HEAT RETENTION

As mentioned above, a chimney mechanism will aid the growth and spread of a fire. It is often useful though, especially during the initial phases of a fire, that heat be retained, in order to vaporize fuel quickly and get it burning. So for the best fire, find a way to balance air flow and heat retention.

The best way to explain how to deal with these conflicting conditions is to explain the difference between a fireplace and a wood stove. Both use a chimney to draw fresh air into the fire and channel smoke outside. The stove though is very efficient at heating a building, while the fireplace is extremely inefficient.

The reason for this is that the fireplace is right below its chimney, so its heat simply rises up out of the chimney along with the smoke. The wood stove is not directly below its chimney; the chimney draft pulls air through it, but the stove's heat rises up and out into the room. The stove also concentrates heat much better than a fireplace, and so burns its fuel far more completely, without the fuel having to be poked like fireplace logs.

Ceilings to concentrate heat can be made out of wood tables, doors, and similar things, that will eventually become fuel. Build them into a wood stove, that will allow smoke out and air in but will retain heat. After the fire gets going well, it will take care of itself, as long as it has air and fuel. The top and sides of the stove eventually become fuel; make sure they are set where they will fall into the fire after they burn through, not before.

OXIDIZERS

The most common oxidizing agent is free oxygen in the air. Twenty-one percent of the air is

oxygen, which is enough to allow only inefficient combustion. Since fire is such a powerful device, an inefficient fire is usually efficient enough to make a powerful weapon. But a fire can be made a great deal more efficient, and so more powerful, by adding more oxygen.

Some chemicals contain oxygen, and can support combustion without the need of drawing oxygen from the air. Some mixtures produce heat without oxygen. These chemicals are referred to as oxidizers, or oxidizing agents. Among the best known of these is the potassium (or sodium) nitrate found in black powder. The efficiency of that mix is evidence of the power of combustion when it has the right amount of oxygen; the mix is typically three-quarters oxidizer.

The use of oxidizing agents is dangerous, and should only be undertaken by someone with a substantial knowledge of chemistry. Some combinations of an oxidizing agent and fuel will produce heat on their own and burn spontaneously. This reaction might take place in under a minute, or it might take much longer. So be sure you know what you're doing before you mix oxidizers with fuel.

Spontaneous combustion will be covered in detail in Chapter 4.

There are many chemicals that can act as oxidizers. A chemical is probably an oxidizer if one of the following names is part of its name: bromate, chlorate, chlorite, hypochlorite, nitrate, nitrite, perborate, perchlorate, peroxide, permanganate, and persulfate.

The fact that a chemical has one of the above words in its name indicates that it will probably improve combustion, but not necessarily. For example, household hydrogen peroxide, used to disinfect cuts, is only about three percent hydrogen peroxide, and ninety-seven percent water. A mix like that will not improve combustion.

Even if you don't remember the names, oxidizers carried in government-approved containers are labeled as such. A few of the more important oxidizers will be explained in some detail:

POTASSIUM CHLORATE

By itself, potassium chlorate is non-flammable, but when mixed with anything that is flammable, it is a strong oxidizing agent that greatly increases the flammability of the fuel it is mixed with.

Military manuals give recipes for an improvised incendiary material made with potassium chlorate and granulated white sugar (not powdered). It is made by placing equal parts of the two substances into a glass jar, filling the jar halfway. The jar is then rolled on its side until the two are thoroughly mixed. This must be done carefully, because potassium chlorate mixed with fuel (i.e., sugar) will catch fire very easily and will burn very vigorously.

Like sugar, potassium chlorate is water soluble. If the two are mixed in water and dried, the mixture will be more sensitive.

The mix looks like table sugar, and so is easy to hide. It is poisonous. It will take fire readily from a fuse, and transfer the fire to another fuel. Concentrated sulfuric acid poured onto it will ignite it. For more on this, see "Chemical Systems" in Chapter 4.

Sodium chlorate can be used the same as potassium chlorate.

AMMONIUM NITRATE

This common fertilizer is a powerful oxidizing agent. Mixed with certain fuels, such as fuel oil, ground polyethylene, charcoal, or ground paper, it is explosive. In order to detonate reliably, this mix needs a strong initiator, such as a blasting cap and stick of dynamite.

Without an initiating explosive, ammonium nitrate mixed with fuel will burn very well; in very big piles or if confined it might explode.

Ammonium nitrate will suck moisture out of anything it is in contact with, including the air. The moisture will reduce its value as an incendiary agent, but only somewhat, depending on the amount. Ammonium nitrate mixtures with up to eight percent water can detonate.

HYDROGEN PEROXIDE

This oxidizer, a syrupy liquid, is used in bleaching (i.e., hair, etc.) and metal finishing, among other things. It is commonly mixed with the fuel that propels rockets and torpedoes. Commercially it is available in solutions ranging in purity from three to thirty percent; these solutions are worthless. Stronger concentrations can be found in metal-finishing plants and certain other industrial areas.

According to *Fire Protection Handbook*, "Solutions at concentrations of between 86 and 90.7 percent [are]...detonatable. At a concentration

above about 92 percent, the liquid can be exploded by shock. Concentrated...vapors can be exploded by a spark. At atmospheric pressure, the boiling material must be 74 percent hydrogen peroxide or higher to produce explosive vapors."

CALCIUM HYPOCHLORITE

This is commonly sold as a disinfectant for swimming pools, and is also sometimes used by water utilities to chlorinate drinking water. It reacts with many organic fuels, causing spontaneous combustion when the fuel and oxidizer come in contact.

For more on this, see "Chemical Systems" in Chapter 4.

BOTTLED AND PIPED IN OXYGEN

Pure oxygen and oxygen-enriched air are often contained in bottles for various purposes. Sometimes they are stored in big tanks and carried by pipes to areas throughout a building or site. This concentrated oxygen can be used to greatly increase the destructive power of fire, making it grow far more intense, much harder to put out, and more likely to explode. Oxygen bottles and pipeline valves are usually easy to identify, because they are labeled as oxidizers. The bottles are usually green.

Piped-in oxygen systems always have at least one valve that will shut down the whole system, and usually other valves that will shut down parts of it; in an oxygen-fed fire, one of the first things that will be done is closing the main valve. This valve might be rendered inoperative, and the area around it boobytrapped.

Bottled and piped in oxygen is commonly used with acetylene or some other fuel for cutting and welding steel. This oxygen is typically 99.5% pure. The oxygen is either compressed or cryogenic (liquefied and cooled). Where oxygen of this type is found there can probably also be found the fuel gas it is used with. The two gasses mixed together burn so efficiently that mixed to within a wide range of proportions, they will explode. For more on this see the sub-head "Acetylene" in Chapter 2.

Oxygen is also commonly used in health care facilities, ranging from ambulances to hospitals. The oxygen is stored in various-size bottles, usually close to where it is being used, or big tanks, from which it is piped to where it is used. Air tanks used for underwater diving and going into fires and other environments where the air is unfit to breathe contain only normal ratios of oxygen to air.

Pressurized air, commonly used in industry to drive power tools, among other things, will fan a fire and help it grow. Air compressors can be found all over the place, from gas stations to farms. This air is not oxygen-enriched and so will not have the powerful effect of such air, but it will expand a fire well enough that if there is a source of it in an area you want to burn, you might as well turn it on.

WIND

Nature's oxidizer is the wind, which carries away air depleted of oxygen and brings in fresh air to feed it. In fires set outside, wind will greatly affect growth and direction. It can make a fire big and carry it so quickly and unpredictably that even people who know fire well sometimes get trapped by it.

In the chapter "Attack by Fire" in *The Art of War*, Sun Tzu recommends setting fires on days of rising winds. He also says that if you set a fire up-wind you should not attack from down-wind, which seems to be good advice. Study weather to understand the mechanism of wind, and use the wind to carry fire where you want it.


FLAMMABLE

Chapter Four

Igniters

A fire is initiated by an ignition mechanism, referred to in this book as an igniter. The igniter can be mechanical, electrical, chemical, solar, or an act of God, such as lightening. To be effective in setting a fire, an igniter has to produce sufficient heat and be of sufficient duration to get the fuel it is applied to burning.

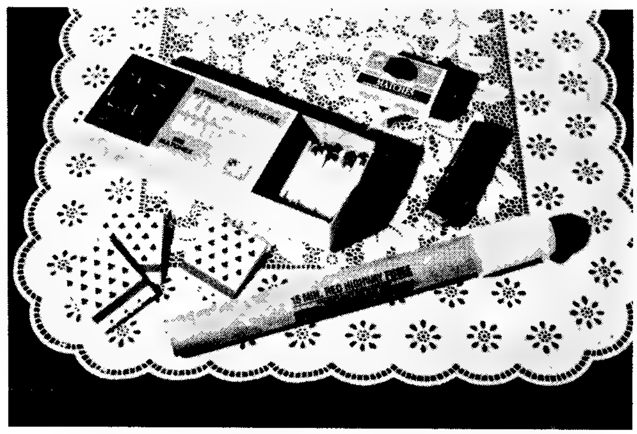
Usually an igniter is used with an intermediate source of fuel that acts as a booster, that extends its burn time and expands its fire. These boosters are usually referred to as tinder, kindling, or accelerants. They are covered in Chapter 2. It isn't always clear where the igniter stops and the booster starts, so there is some overlap between chapters.

Igniters run the range from a butane lighter used to activate a Molotov cocktail to a hot wire used to light a time-delay system. Often the same igniter, such as a match, can be adapted for use with a variety of devices.

It is a fundamental principle of combat that weapons should be as simple to use as possible. Things that work well in a laboratory sometimes fail in the field because they are too complex. Even when there is a lot of time available and no immediate threat, unexpected things often come along and cause a plan to fail. So keep all your devices as simple as you can. This is especially true of the ones that initiate ignition.

FRICTION SYSTEMS

Igniters that initiate heat primarily through friction employ mechanical devices to provide the friction, such as a flint striking against steel, or a match drug over a striker.

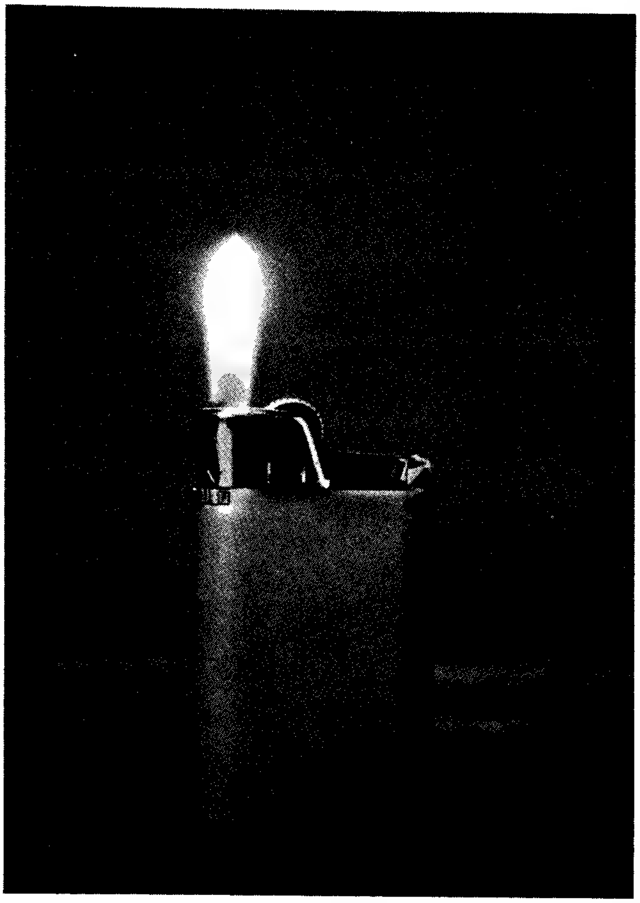


Some of the best igniters are friction type: matches, flint and steel cigarette lighters, and road flares all initiate fire by rubbing one thing against another.

CIGARETTE LIGHTERS

This device consists of a store of fuel, and an ignition mechanism made of steel striking across flint. The simple act of rotating the striking wheel with the thumb produces sparks, which ignite the vapor of the fuel contained in the system. It is a very simple, reliable, and powerful weapon. It contains enough ammunition to start a great many fires and it is rugged, easy-to-carry, and waterproof. It is very easy to obtain, and costs under a dollar.

There are primarily two types of cigarette lighter: liquid fuel and butane, the latter typically being disposable, the former being refillable. Liquid fuel lighters are less susceptible to being put out by wind, which makes them more reliable in some situations. Some butane lighters have adjustable flames; setting them for the biggest

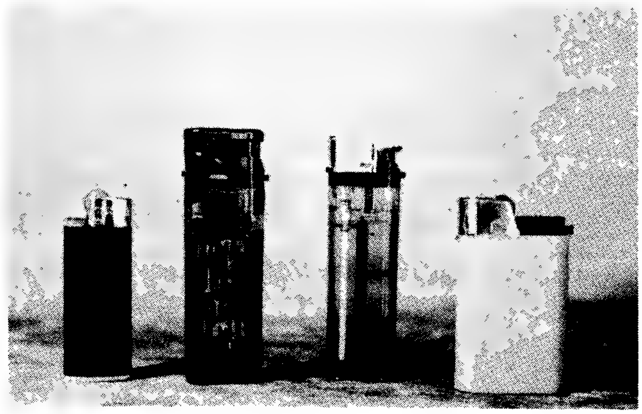


The use of flint striking against steel has been used to initiate fire for centuries. The state-of-the-art version of that mechanism, a cigarette lighter,is among the most useful of all incendiary devices: it 's easy to use, easy and safe to carry, waterproof, and very effective. Its fire-starting capability is equal to that of many boxes of matches.

flame possible can make ignition of some incendiaries easier.

Butane lighters are usually made so-called childproof, by having some sort of switch that has to be manipulated before they can be lit; in this way two deliberate motions are needed instead of one to initiate fire. These lighters will be more difficult to use in high stress situations, where the first motion might be accidentally omitted. Childproof devices can often be removed with a knife point; although this can cause them to leak, so that they run out of fuel sooner.

Lighters that you can see through have the advantage that you can see how much fuel you have left.



Not all lighters are equal. The mini Bic on the left is the easiest to carry concealed. The so-called turbo is electronic instead of friction; it isn't any better than the conventional type. The see-through lighter lets you see how much fuel is left, which is very worthwhile. The one on the right claims to carry enough fuel to start four-thousand fires (according to its package), but isn't much bigger than the others. The Bic has the most user-friendly safety.

A cigarette lighter is not as powerful as bigger devices like flares, but it is powerful enough to initiate fire, and often that is enough. It compares to its big brothers like a handgun compares to a rifle. A miniature lighter is like a derringer (but a lot easier to carry and hide).

Disposable plastic lighters are state-of-the-art hand-held fire initiators. Their mechanism is remarkably similar to that of a state-of-the-art handgun: the so-called plastic gun/assault weapon: the Glock pistol. An easy-to-carry plastic handle contains a large supply of ammunition, which is fed by pressure into a steel chamber, where its potential energy is released in a controlled manner.

A fireman should carry a lighter whether he smokes or not; it can be as useful as a pocket knife or pliers. For concealment you might also need to carry cigarettes in some situations. These are good for five-minute fuses and starting smoldering fires, but you shouldn't smoke them; let the feminazis smoke their Virginia Slims all they want; patriots should take care of their health.

FLARES

These incendiary devices are designed to attract attention by burning brightly. Road flares always have their own ignition device, and

A road flare is a powerful igniter: it has its own ignition mechanism or a different one can be attached easily. It burns very hot for around fifteen minutes. It carries its own oxygen, so it will burn even when it is flying through the air or under water. It's easy to carry, and it works well in combination with other things.

instructions on how to use it. Signal flares have a gun as their ignition device. They are all easy to carry, easy to use, and reliable. They are very good firestarters.

Flares are designed to work even in heavy rain, and so are very resistant to water. Once one starts burning, it's next to impossible to put it out. The amount of time they will burn is usually given on their label.

Compared to other igniters they have a long burn time, and so are a combination igniter and secondary fuel. Or they can be used purely in the latter sense, taking fire easily from any of the devices covered below.

Road flares are available from auto-supply stores and the auto section of Wal Mart stores. Flare guns are far less common. They are used by the military, and sometimes by civilians, such as on ships.

BOOK MATCHES

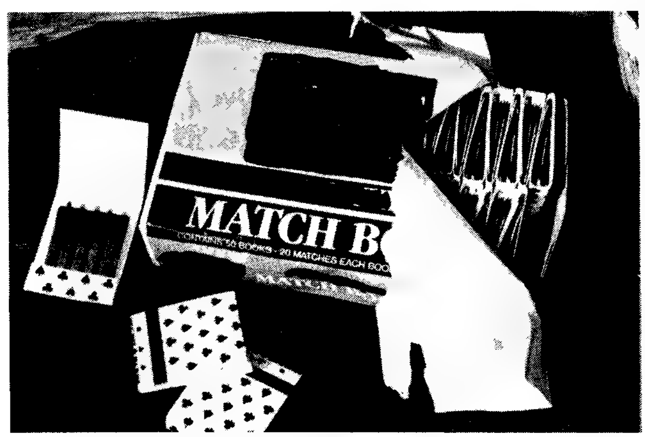
One of the most useful of all devices to the arsonist is the common book of matches. Billions of these books are produced a year in this country alone; many are given away. So they are very available, and either free or very cheap. They have been used and so tested in the laboratory of experience over many years. This mass test has demonstrated that if certain rules are followed, they are very reliable.

Book matches produce a very intense flame of short duration (around a second), followed by a less intense flame that lasts several seconds or longer. Both burning phases will be nineteen times bigger if one match is used to ignite the rest. But if one match can do the job, save the rest for other fires.

Book matches can usually be found at grocery, convenience, and K Mart-style stores, in boxes of fifty books. Quality varies a little, but they're all good. Cost varies too, but it isn't ever very much.

Book matches are often called safety matches, because they can only be lit by being struck against the strip supplied for the purpose on the outside of the book. This is because one of the chemicals needed for ignition is on the strip, not the match. So one of the rules that needs to be followed with this device is that the matches must be used together with their own striker, and the striker needs to be in reasonably good condition.

Another rule is that both the matches and their striker must be kept dry. If they are wet they absolutely will not work. If they get wet and are thoroughly dried they might work, but probably not, and not very well if they do. Even very high humidity, especially in the form of fog, or sweat from your pocket or fingers, can render them useless.



Book matches are among the most useful of all incendiary devices: they are plentiful, cheap, and very effective. Very good pull igniters can be made from them, and they can easily be added to other igniters to increase power. They can usually be found at grocery, drug, and other stores, in boxes of fifty, for around a dollar. They are often given away, though not as much as they used to be.

This means that igniters made from book matches need to be either used where they will be protected from rain and other water, such as inside a building, or used when it is known that they will be used before there is any rain, or they need to be given a cover that will keep water away from them. The one using them needs to keep his fingers dry. If book matches are carried in a pocket, they need to be protected from sweat, as well as water from an external source, such as rain. They might need to be carried in a sealed plastic bag or some other waterproof container, though a pocket on external clothing, such as a jacket, is often good enough. Keep in mind that the match heads and striker both need to be in good condition, and the striker is on the outside of the cover.

Often one match is all it takes to start a really big fire. But sometimes the entire book is used, since they are so cheap and plentiful, and a book makes a bigger fire than a single match. This is done by lighting one and using it to light the rest. The book is then thrown or dropped immediately onto the fuel.

Matches also make good tinder. Usually the lower they are placed the better, since fire burns up.

Liquid fuel poured directly on a match flame will probably put it out instead of taking its fire. Fuel sprayed directly on it will also probably put it out. It is better to apply the match to the fuel, not the other way around.

LIGHTING BOOK MATCHES WITH ONE HAND

One characteristic of book matches is that they are a little difficult to light with one hand. Usually this is not a problem, but if one hand is wounded, or is already holding something else, it might be necessary to light a match using only one hand. If you want to produce flame suddenly and by surprise, it might be useful to hold a book hidden in one hand.

This is done by folding one match around the book, until the head reaches the striker. The technique is easier if the match is folded in several places and made pliable. If it is folded around the bottom of the book, the match is just barely long enough for the head to reach the striker, so it must be folded as far down as the book will allow.

Make sure your thumb is dry. Place it directly over the match head and striker, and rub the match head against the striker until ignition occurs, which is usually after about an eighth or quarter inch of movement. At ignition the thumb is pulled away immediately, or it will get burned.

With some practice, this technique is easier than it might sound, and if your timing is good you won't burn your thumb. But since your thumb is placed directly over the match head, and even pushes against it, you can get burned pretty bad if your timing or coordination are not good enough.

Make sure your other fingers are out of the way too. Since the match head is made of phosphorus, a direct burn from it can be serious, and your thumb is an essential part of your hand. So take time and care in mastering the technique. Don't use it under stress if you haven't mastered it.

MATCHBOOK IGNITER

A very good igniter can be made from a book of matches and a rubber band or tape. It is made from easily obtainable material, and it is very inexpensive: even a unit complete with steel lugs and a waterproof jacket costs well under a dollar; the basic unit, a book of matches and binder, costs a few pennies or less. If it is made right and both the book and the matches are in good condition, and it remains dry, it is very reliable. The original flame is hot enough to reliably light fuses and most intermediate fuels. Where a bigger flame is needed, more matches can easily be added. It can be made waterproof.

Work station set up for the assembly of matchbook igniters: raw material on the left becomes a finished product on the right. The essential components of the igniter are a matchbook and rubber band or tape; everything else is an improvement.

This igniter produces an intense flame for a little over a second, followed by a less intense flame for several seconds or longer. Since the match heads are at the tops of the matches and fire burns up, if the igniter is positioned so that the matches are above the striker, the flame will continue until the matches are completely burned; tape, rubber bands, and string used to form the igniter, and rubber used to waterproof it, will also burn.

The matchbook igniter is a very useful device. It is a good idea to practice making it until you have a good feel for what you're doing. A box of book matches and roll of tape or bag of rubber bands don't cost much; neither do balloons, wire, and plumbers' putty.

These instructions might make the matchbook igniter seem complicated and difficult to make, but it really is very easy. Certain things just need to be done right. Once the process is known, the basic unit can be made in under a minute. Adding lugs and making it waterproof takes a little longer but is not difficult.

MATERIAL

Use a book of matches in new condition, preferably with all of the matches. A matchbook that has been carried in a pocket or had a few matches removed and struck on its striker will probably work, but use the best book you can get. Remember that a chemical on the striker is essential to the ignition process, so the striker has to be in good condition.

To hold the matches squeezed tight over the striker, you use either tape or a rubber band. String will work but is harder to work with. Any good tape will work; electrical is the best and easiest to work with. Medical tape is also very good. Wide tape such as duct tape needs to be torn into strips a half to three-quarters of an inch wide; this is easy to do with duct tape by simply tearing it into a strip as it is pulled off the roll. A rubber band, of the type used to bind newspapers or a little bigger, works very well and is easier and faster to use than tape.

The igniter will be attached to the thing it will ignite using nails, tape, glue, or something else. Lugs can be attached to the igniter when it is made; these are made from wire or string, preferably nylon. Wire is best.

To make the igniter water resistant, if desired, you need a bendable cover such as a balloon, condom, or big plastic bag, and a sealant, such as plumbers' putty, caulk, or wax. It might be faster and easier in some cases to build a waterproof or water-resistant tent around one than to put a raincoat on it.

TOOLS

The basic unit can be made with no tools. Lugs are a lot easier to install if you have an ice pick, and you can do a better job of bending and crimping wire if you have pliers and wire-cutters. All of the above can be done with the fingers and a hammer, but not as easily. Small needle-nose pliers and sissors are useful but not mandatory.

CONSTRUCTION

As you build the matchbook igniter, always keep in mind what you are holding and manipulating. After it is put together it is armed; be careful that you don't pull it apart and activate it as you finish it. Don't have fuel close-by as you assemble it, and don't store it close to fuel.

Keep your fingers clean and dry as you build it, and try to keep them off the match heads and striker as much as possible.

SEPARATE THE BOOK FROM ITS COVER

Make sure your fingers and work area are clean and dry throughout the construction. If you don't want fingerprints on the device, wear plastic gloves as you make it.

The matches are connected to the paper cover with a single staple. Remove the matches from the cover by gripping them at their base with one hand and gripping the paper cover as close as you can get to the staple with the other hand. Do your best to keep your fingers away from the match heads and striker. Pull the matches away from the paper, until the staple pulls through one side of the paper; reposition your hands, working your thumbs between the cover and the base of the matches, as close to the staple as possible, and tear the cover past the staple. Be careful that you don't fold or tear the cover any more than necessary as you do this.

You can also simply use the point of a knife to carefully straighten and pull the staple out instead of tearing the cover off of it as described

above, but the staple, which holds the two sections of matches together, makes the rest of the process a little easier.

FORM THE STRIKER ASSEMBLY

The striker assembly is made from the matchbook cover.

Make sure all folds are straight and square and symmetrical. Crease all folds and make them tight. The instructions might make assembly sound like a rigid set of movements, but it is more like shaping something out of clay, with your fingers forming pieces into the right places as the folds are made.

The first step is to fold the part of the cover below the striker upward into three sections that will set behind the striker. This will give the striker a bulge that will make it rub hard against the match heads when the igniter is activated. It is important that the bulge begin slightly below the top of the striker.

First fold up toward the inside a section at the very bottom of the cover a little less in width than the width of the striker. This will put the bottom edge of the cover below the existing fold.

Make another fold of the same size and in the same direction, using the existing fold. This will put the first fold you made about an eighth of an inch below the bottom of the striker. If it is higher than the bottom of the striker, you made your folds too big, and you need to go back and make them smaller.

Make one more fold in the same direction. The top of the bulge you have folded should be slightly below the top of the striker. If it is not, go back and make your folds tighter. A very thin strip of bare cover should be visible below the bottom of the striker.

With the bulge in the right place behind the striker, fold the cover in half lengthwise. A table edge makes this easy, but it's pretty easy without one. Just make sure the fold is straight and exactly in the center. You don't need to go to a lot of trouble to do this, just make sure the edges all line up as you form it, and don't crease it until it's right.

ASSEMBLE THE IGNITER

The matches are in two sections, stapled together (unless you have removed the staple). Work the striker assembly in between the sections, with the striker well below the match heads and above the staple. The striker puller sticks through and above the match heads. This assembly is centered between the outer edges of the match sticks, running parallel to them.

Make sure that the puller is between the two sections of matches, rather than woven through them. The easiest way to accomplish this is to separate the two sections with your fingers, then work the puller in sideways, folded side first, between them. After it is inserted in this way, turn it ninety degrees so that it is vertical, as described above. Push it in as close as you can get it to the staple without forcing.

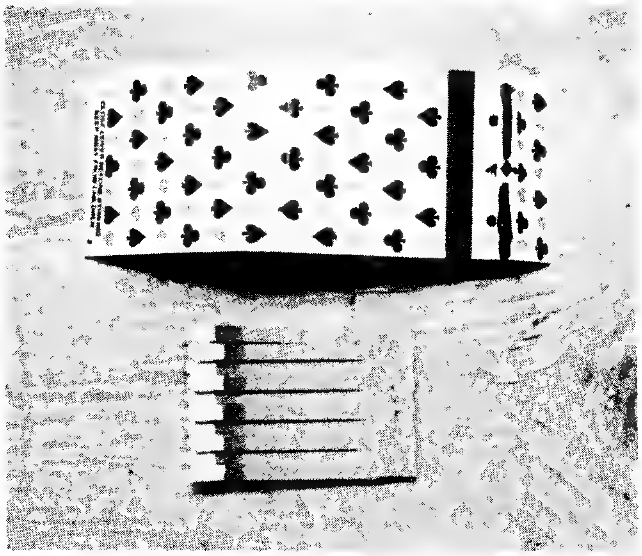
If you want less slack in your trigger, the striker can be moved a little closer to the match heads, but you need to be able to wrap tape or a rubber band around the match sticks between the heads and the bulge made by the striker. You can feel the bulge with your fingers.

If tape is used, wrap it around the match sticks, above the striker and just below the match heads. It is very important that the tape not cover the match heads; if it does they will not produce a good flame. But it needs to be as close as possible to them in order to pull them tight over the striker assembly.

This first strip of tape is not wrapped tight; its purpose is to hold the match heads in the right position. This means more or less flat against the striker assembly, and with a few match heads beyond either edge of the striker assembly. This positioning is important. Matches will try to bunch up when you tape them tight, and you need to make sure that there are matches between the edges of the striker assembly and the tape; otherwise, the tape might stick to the striker and make it hard to pull out. Hold them in place with your fingers as you make the first wrap, and form them into position afterward if they get into the wrong position.

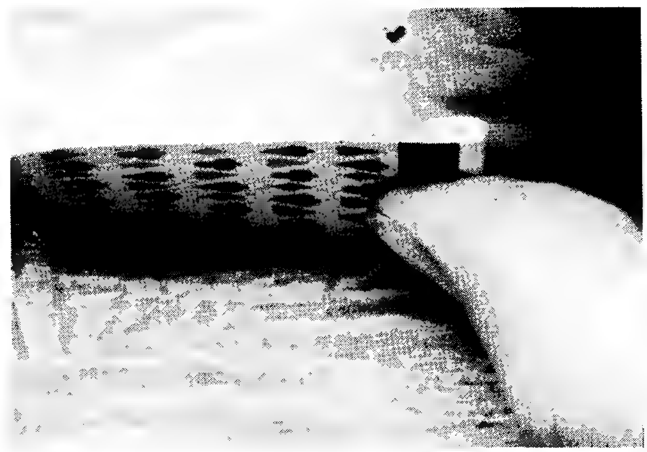
After the first strip is wrapped and the matches are in the right position, make several more wraps around the matches, always keeping the tape below the match heads and above the striker. The tape needs to be wrapped tight enough to pull the striker and match heads together forcefully enough to insure ignition, but not so tight that the striker assembly is overly difficult to remove. This isn't hard to do; it just takes a little practice, with trial and error as the teacher.

Matchbook Igniter Assembly

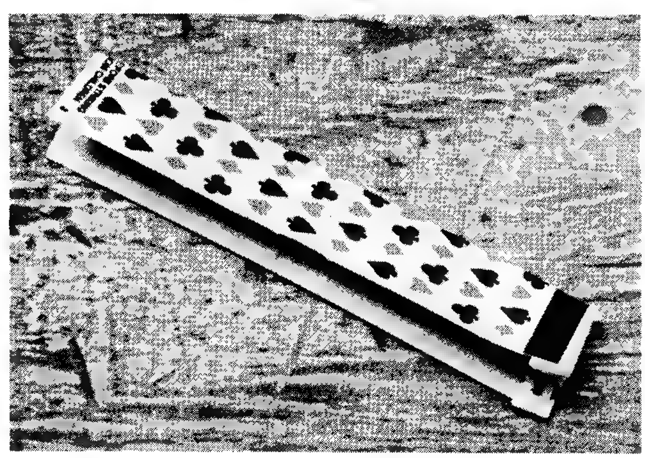


Remove the book carefully from its cover. Do not tear the book any more than necessary as you pull it free of the staple.

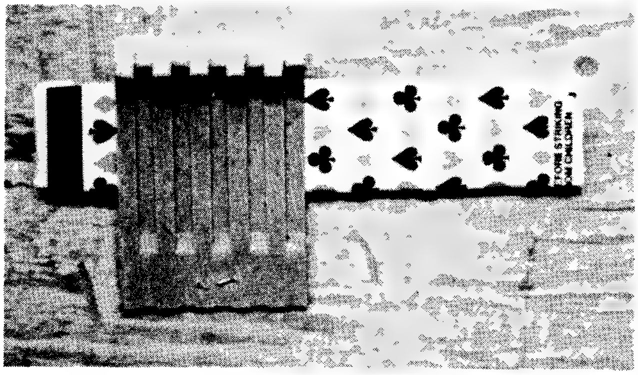
Fold a strip of the paper that extends below the striker; the width of the folded strip is the same as or a little less than the width of the striker.



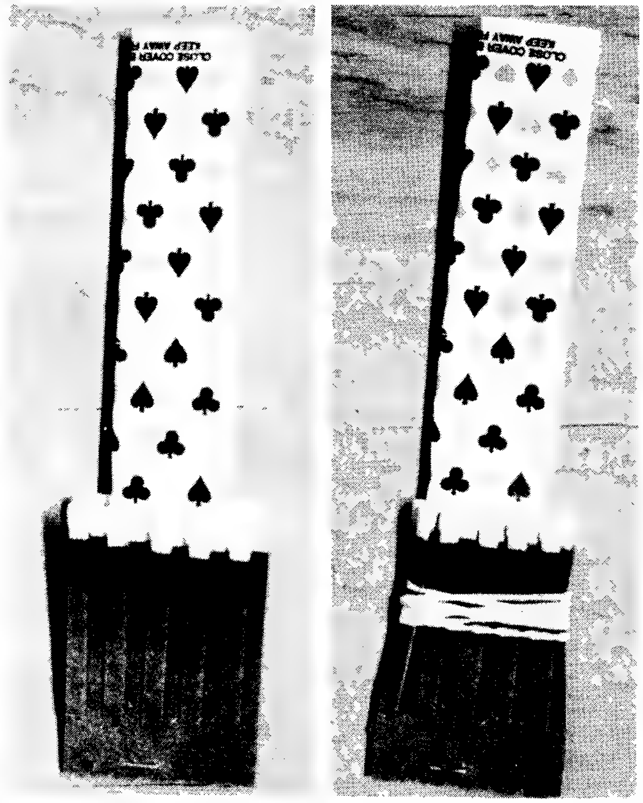
Make two more folds in the same direction, forming a bulge behind the striker. The top of the bulge is below the top of the striker.



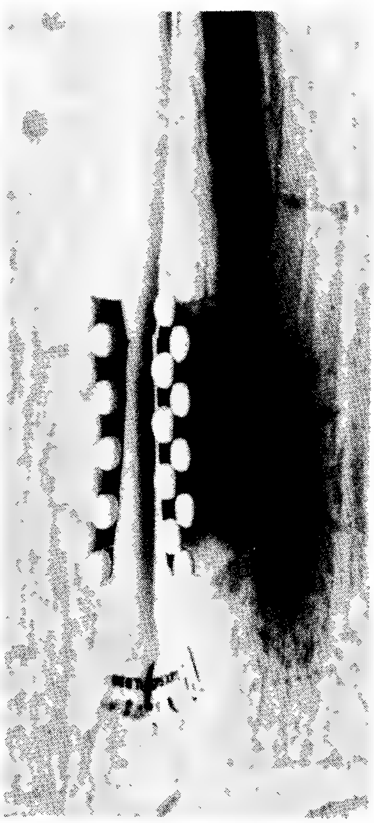
Fold the striker lengthwise. Make the fold straight and square.



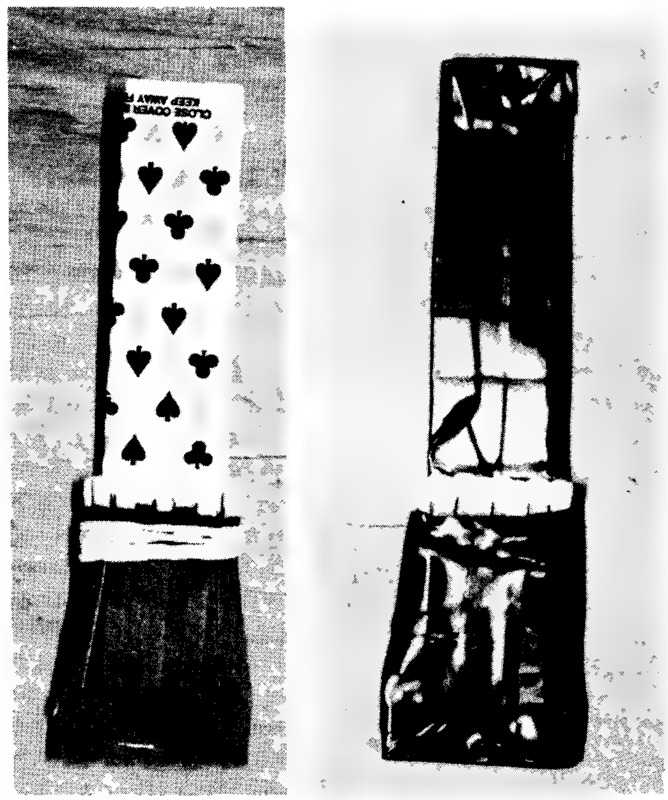
Set the striker between the two rows of matches, working the folded edge down between match heads.



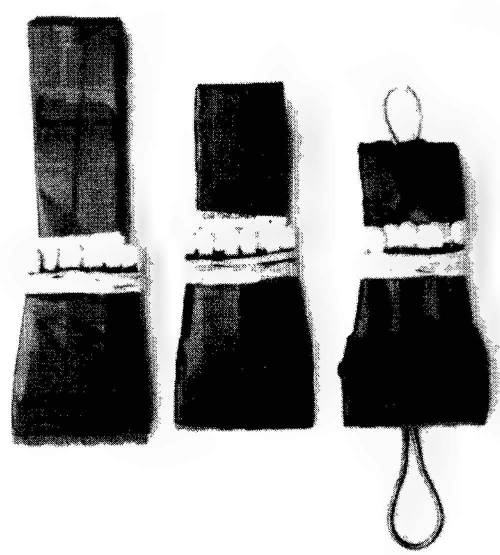
(Left) Turn the striker ninety degrees, so that it is parallel to the match sticks. Make sure it is centered. (Right) Wrap a rubber band around the match sticks, being careful to keep the striker perfectly centered. Getting the right amount of tension takes a little practice. If a rubber band is unavailable, the same thing can be done with tape or string, though not quite as easily.



Make sure the striker is between the two rows, not woven into them.



(Left) Make sure the striker is centered, and roll the rubber band up until it is just below the match heads. At this point the basic igniter unit is ready; it can be used as is, or improved. (Right) One very useful improvement is to wrap the matches and striker with tape. This should be done before any other improvements are made. There should be no tape on the match heads. Do not wrap the tape tight and cause excessive tension; just make it secure.



The striker-puller can be cut or folded to any length you want it. The igniter can be used in this form, or improved in a number of ways.

Continue holding and forming the match heads into position as you wrap tape around the igniter a few times, making it as tight as it needs to be. Feel for the bulge to be sure it is below the tape during wrapping.

If a rubber band is used instead of tape, do everything the same as described above, but with a rubber band instead. The latter is easier to use and better, because it has more elasticity. Newspaper size works best. Hold the match sticks in position over the puller with your thumb and index finger as you bind them. Wrap the band less tight the first few wraps as you work the match heads into position with your fingers, then tighter as you go, until you have the right amount of tension. Roll the rubber band up against the bottom of the match heads when you're through wrapping.

If an igniter is not going to be waterproofed, a good way to attach a line to the striker is to tie a non-running loop (i.e., bowline) in the line, pass the striker tab through the loop, and fold the tab over on itself, then tape the folded tab securely to itself. Make sure the line runs off the center of the striker for a straight pull.

You can tell by looking whether rubber bands have the right amount of tension. Since a small rubber band has less width than tape, you can set the amount of slack in the trigger a little shorter with it if you want to. The striker should not set under the rubber band, unless a very sensitive trigger is desired. It should not be carried in this way.

If all you have is string, tie a clove hitch where the tape goes, and add a few more wraps. Since string has little or no give, there is less tolerance in regard to tightness.

Once the match heads are held tight against the striker assembly, the unit is complete; when the two components are pulled apart, the matches will ignite. The igniter can be used in this form, or it can be improved, by the addition of tape to secure its integrity, lugs to make rigging easier, and a waterproof jacket to protect it from bad weather; it can be made more powerful, and its burn time can be extended.

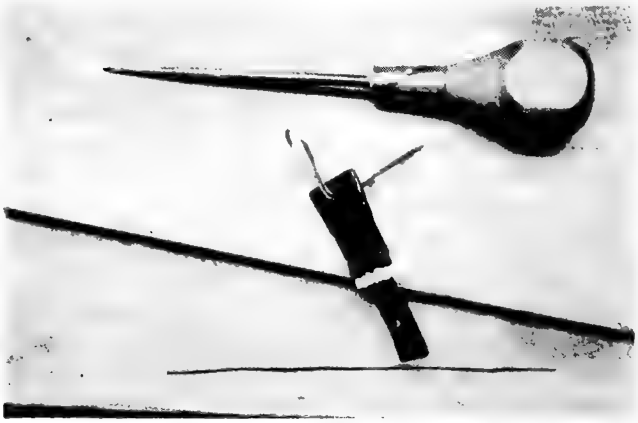
The striker can be left unfolded and uncut, or it can be shortened. Shortening is best done by folding, because folding doubles the thickness of the paper and so doubles its strength. To make it shorter than folding alone will allow, cut off the amount that extends to past the tops of the match heads when it is folded to its desired length. It should not be made shorter than three-quarters of an inch above the match heads.

When the puller is folded to the desired length, the mechanism can be made more durable by wrapping tape around the matches from the base to just under the heads. Make the tape secure but not tight; its purpose is to hold everything in the right place, not apply pressure. Make sure the match heads are in the right place before and as you tape them. Tape the striker the same way.

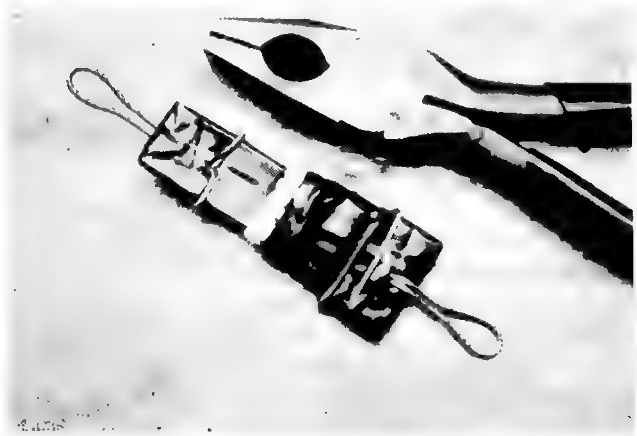
LUGS

A little extra work in the shop can make employment of this device in the field a lot easier. One or two lugs to give you something to tie lines to can make your incendiary mechanism easier to build and the igniter more reliable. If the two components are to be nailed, taped, or glued to something, or operated manually, they only need

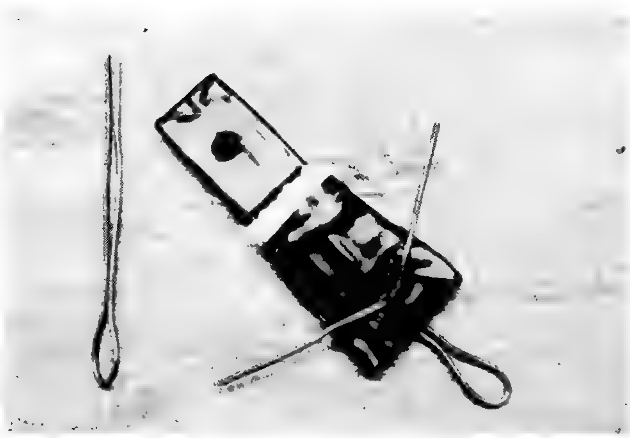
Lugs added to the striker make rigging far easier and more secure.



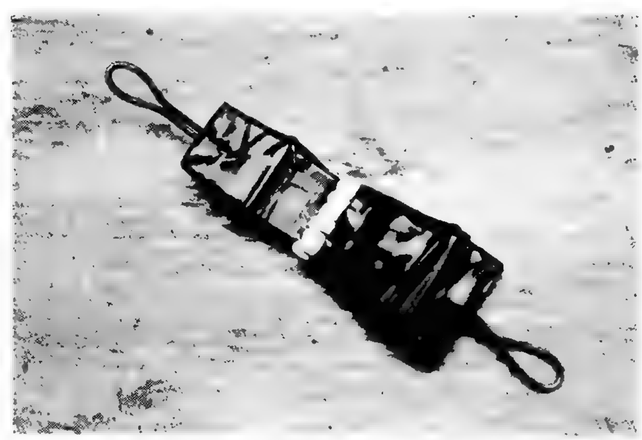
Use an ice pick or awl to punch a hole through the base of the match sticks. Fold the striker back on itself to double its strength, tape it down, and punch a hole through the center of it. Wire lugs are inserted through these holes.



The wires are wrapped securely around the matches and striker and crimped with pliers (or a hammer, etc.). The wires are inserted from opposite sides for a better pull.



Fold two pieces of tie wire five or six inches long in half. Bend the doubled wire ninety degrees, then insert the ends through the holes in the igniter. Wrap the wire around the igniter.



Tape is wrapped around the lug wires, to further secure them. Lug installation is complete at this point. Note that there is a quarter- to half-inch of straight wire between the igniter and the lug eyes. This is necessary if the igniter is to be waterproofed.

a lug if the igniter is to be made waterproof. In some cases one component will need a lug but the other will not.

Before installing the lugs, reinforce with tape both the base of the matches and the part of the striker strip that extends above the match heads. This will keep the lugs from ripping through the paper, and also help maintain the structural integrity of the device as you install the lugs.

Wrap tape around the base of the matches a few times; form it to the shape of the match base, but do not wrap it tight.

Lay a strip of tape longitudinally along the open edge of the puller, sticky side on the strip, with one half of the tape stuck to the striker, and the other half open, then fold the strip over, taping closed the opening. Carefully fold down over the top any tape that extends above the top of the puller.

Tape the opposite edge of the puller in the same way. Then lay another strip flat along one flat side of the puller, run it over the top, and down the other side, stopping short of the match heads.

Use an ice pick or awl to punch a hole through the two sections of matches. The hole should be centered over the base of the matches, where the paper becomes solid. The hole is easy to make if you lay the igniter on a piece of wood as you start the hole, then move it so that the point of the ice pick and hole are directly over the edge of something as you push the ice pick blade on through. Don't stab yourself.

Fold three-quarters of an inch or more of the top of the puller back on itself. Punch a hole through the folded-over puller, a half to three-quarters of an inch from its top.

The lug can be made with nylon cord or tie wire; the latter is better, and if you intend to make the device waterproof, it is far better. Tie wire is available at hardware and other stores that sell building products. A pair of pliers makes the job much easier and the results better, but it can be done without them.

Cut a piece of wire five or six inches long. Fold the wire in half and back against itself. Use pliers to squeeze the wire together, leaving roughly a half inch opening at the end; this opening is the eye of the lug. Grip the wire in the jaws of the pliers about an inch from the opening, and bend it ninety degrees. Run the two ends, which are still together, through the hole in the matches, all the way to the bend, with the lug eye extending down below the matches.

There should be at least a quarter-inch of straight wire between the edge of the igniter and the eye of the lug if the igniter is to be made waterproof. This is to form a notch that the rubber band pulls the putty and rubber into. An igniter with a heavy coat needs to be beefed up, so the straight part between the eye and the edge of the igniter needs to be longer, to compensate for the matchbooks that extend below the bottom of the original book; three-quarters of an inch is a good length.

After the two wires are pushed through the hole, pull the two wire ends apart, and wrap them in opposite directions around the base of the matches. Keep the wire away from the striker bulge, and use the pliers or a hammer to crimp the wire down tight.

Cut another piece of wire roughly five inches long, and make a lug in the puller as described above for the matches.

Wrap tape around the wire, to reinforce the lugs and keep the ends from possibly tearing a hole in the waterproof cover that will be added later.

INCREASING POWER

One book of matches will easily light a fuse, and will ignite many intermediate fuels. Taping, gluing, or tying a lot of matches over and around the igniter will increase power and also the probability of secondary ignition; this is one way a little fire quickly becomes a big fire.

An igniter with extra matches added to it will make a much bigger fire with a longer burn time on its own, and matches are cheap. The addition of more match books increases the size of the igniter though, which complicates both carrying and rigging; often smaller is better, and it's just as easy to add expanders after the igniter is installed. Add matches to an igniter after the lugs have been installed.

Remove a few books (or as many as you intend to add) from their cover; it's best to use an even number.

Set the first book against one side of the igniter matches, with the heads against the heads of the igniter. Tape that book in place with a few full wraps of tape. Do not wrap the tape tight; you have already set the right amount of tension

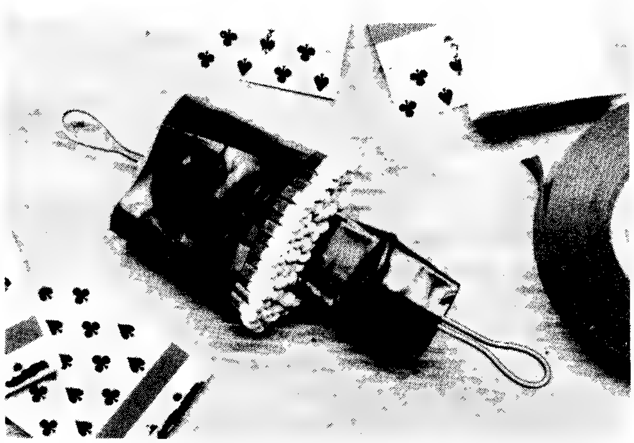
between the striker and its matches. Adding more tension by wrapping tape tight will add unnecessarily to the amount of force required to activate the device.

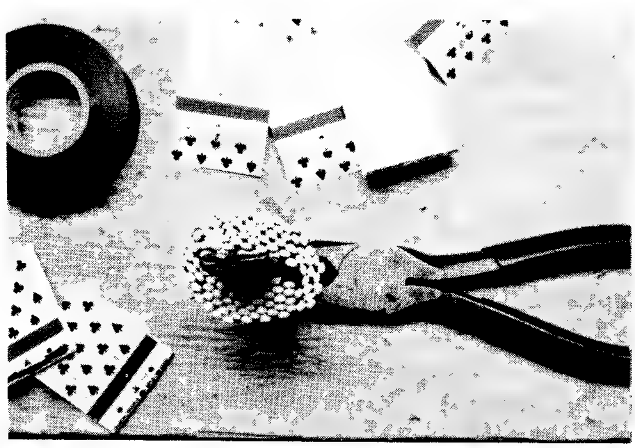
Tape the next book of matches to the opposite side in the same way.

If you want to add more, set the next matches with their heads against the matches you just installed. Then do the same to the opposite side.

If you want to add more, bend a book around one side, perpendicular to the ones you just added, like the missing side of a box, and tape it in place. Do the same to the other side.

In this way you can add as many books as you want, continuing to set the heads just above or below each other. Tape each book individually.





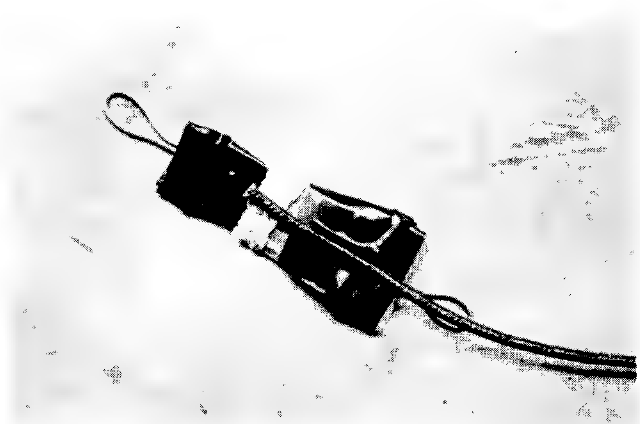
An easy, effective way to expand power is to tape more match books to the base igniter. Add as many books as you want, but try to keep the igniter centered in them. There needs to be a lug on the base matchbook when this is done; otherwise the added matches might pull loose, causing the igniter to fail.

You can also cut the heads off the same number of match books and simply dump them into the waterproof jacket (if one is to be added). This will give you the same amount of flash in a smaller package, but you will lose the extended fire of the match sticks. In most cases this will not be a significant loss, and the smaller package is easier to carry and work with.

There are many other ways to increase power. Black powder will either flash very hot or explode if it is confined; it will not burn for very long. So-called smokeless powder will flash hot and is unlikely to explode. Thermite and its starting powder can be added for a really intense fire and longer burning time, followed by a pile of really hot slag. These can all be simply dumped into a waterproof jacket, or put in a cardboard sleeve surrounding the igniter.

Taping a fuse to an igniter will expand power by carrying fire from the igniter to whatever the fuse is connected to.

Another way to increase power and reliability is to use multiple igniters; they are cheap, small, and easy to rig. A pocketful of them don't take long to install (be sure to carry them safely).



To turn the igniter into a fuse-lighter, tape a fuse securely to it. Make sure the fuse extends to and a little past the match heads, and is held securely with tape against them; do not tape over the match heads themselves. To use it as a hand-held device, bend the lugs ninety degrees or run something like nails through the eyes for a good grip, and drop it immediately after ignition so that the fuse doesn't burn your hand.

EXTENDING BURN TIME

One way to extend burn time is to hang the igniter with the puller down. Since fire burns up, an intense fire at the bottom of the igniter will set the matches, tape, rubber band, and jacket on fire, and the fire will burn up through them.

Fire can be extended by dipping the match books in something like wax or paraffin. Do not dip the matchbook immediately surrounding the striker, and make sure you don't get wax or any other liquid on those match heads or the striker. Dip each individual matchbook and let it cool a little before adding it to the igniter. If wax gets on the striker or the part of the match heads it will strike against, the device will probably fail, depending on how much of the striking surfaces get covered.

The next level of extension is to secure the device to a secondary fuel source, as described in Chapter 2. The igniter and additional books can be taped to things ranging from a Boy Scout firebug to a common paraffin/sawdust fire log (make sure you read the instructions on the package about how to get the log burning well).

There are many ways to expand the intensity and duration of a matchbook igniter; this is one. Since fire burns up, match heads should be close to the low point of the firelog.

WATERPROOFING

Even a little bit of water, including very high humidity, can ruin this igniter, so if there is time and material it should be made waterproof, or at least as water resistant as is practical. This is done by covering it with a waterproof jacket, and sealing the holes where the lugs come out. By leaving the lugs outside of the watertight seal, they can be nailed, wired, or tied to things without the seal being broken.

If the igniter is soaking wet when it is activated, as in a heavy rain or under water, it will burn, as long as its seal has remained intact, but then go out right away, unless it contains a fuel/oxidizer mix. The procedure described below is intended to keep small amounts of water from ruining the igniter. If you want to use it to ignite something in very wet conditions, the thing you want the igniter to ignite also needs to be protected. It can be made, for example, with a waterproof fuse extending out through a lug hole.

The best waterproof jacket is a balloon or condom. Plastic bags and sheets of plastic wrap will work if they are big enough, but they are harder to work with and not as good. Disposable rubber gloves will also work. Rubber bands are needed to close off the two ends where the lugs extend through the jacket. A moldable waterproof substance, such as plumbers' putty or caulking, is needed to seal the holes.

Since the striker needs to be pulled apart to be activated, there needs to be slack put in the jacket when it is installed. A balloon or condom will stretch and so has its own slack; plastic needs to have slack built in. Both will burn immediately after ignition, but the resistance given by the plastic added to the resistance of the igniter itself might be enough to make the device fail, and there isn't any reason for the resistance to be there, since it's easy to build in sufficient slack.

If the covering is very heavy, such as with a good, helium-quality balloon, the igniter needs to have its power increased on the inside of the jacket. Otherwise, the single matchbook might not produce enough heat to burn through the covering. Since the covering is watertight it is also airtight, so if the igniter doesn't burn through right away it will go out right away. If enough matches are added (preferably four or more additional books), the jacket will burn through. Other fuel/oxidizer mixes, such as gunpowder, will do the same.

With a thin covering, such as a disposable plastic glove or kitchen plastic wrap, one book will burn through. Such a wrapping though is less durable than a heavy balloon. With a heavier jacket, matches can be taped to the base igniter as described above, before insertion into the jacket. Or match heads can be dumped into the balloon before the igniter is inserted into it. This can be done easily with a funnel, or by stretching

the mouth of the balloon over a roll of tape. Make sure all of the match heads are on the igniter side of the lug before you wrap the rubber band around it.

The latter method results in a much slimmer igniter that is just as powerful in the initial phase of burning, though it has a shorter sustained burn, because it lacks the match sticks. It will burn more than long enough for most purposes though. Use the heads of four or more books of matches. If you use gunpowder, dump in enough to loosely fill the lower part of the balloon for a really good flash. If you are making many igniters and want to use your material efficiently, experiment to find out how much powder it takes to burn through the jacket.

If the igniter is to be used to light a fuse, the fuse can be run through the same hole in the jacket the lug on the matches runs through. The fuse should extend to or a little beyond the match heads, the end should be frayed a little, and it should be taped securely to the matches. Add two or more additional books of matches to the igniter, with the fuse sandwiched between them and the igniter. Where the fuse runs along the inner part of the lug and out through the hole in the balloon, it needs to be puttied along with the lug, as explained below. A short section left sticking out of the balloon can be attached to a longer section or something else later.

Tape, plumbers' putty, and a rubber band will hold the fuse in position very well. To make the fuse even more secure, glue it to the igniter; be careful to not get any glue on the striker. Or lash it with string. Or both. Then tape it.

Mold a sealing compound around the base of both lugs, extending from the top and bottom of the device to a quarter- or half-inch up the lug. Plumbers' Putty works very well for this; things like good caulking should also work, as long as construction is complete before the caulking dries.

If a balloon is used, the igniter is inserted into the balloon bottom-end first. Since the igniter is much bigger than the opening in the balloon (especially with extra match books or other expanders added), inserting the igniter is somewhat difficult. Two people working together can make the job much easier; one holds the mouth and neck of the balloon stretched wide open as the other inserts the igniter.

If you are working alone, lay the igniter over the edge of a table with the matches hanging over the edge and a weight on the puller holding it in place; reach deep inside the balloon with your fingers, stretch the mouth and neck, and pull the balloon over the igniter. Pull it on until the lug is hard against the end of the balloon.

This might sound difficult but it isn't; a good whore should be able to do it with her mouth.

If the igniter has a fuse taped to it, poke a hole in the end of the balloon with an ice pick, and run the fuse through the balloon and out the hole. Then stretch the balloon over the igniter, as described above, until the lug is tight against the bottom of it and close to the hole the fuse runs through. Before pulling the lug through the hole, wrap a rubber band or two as tight as you can around the base of the lug. Then pull the lug through the hole.

For an igniter without a fuse, make sure the lug is centered under the exact bottom of the balloon, directly opposite the mouth. Wrap a rubber band or two tight around the base of the lug with the balloon surrounding it. Mold the plumbers' putty with your fingers to make the rubber band grip. Then, with an ice pick, punch a hole through the balloon right next to the lug; make sure you don't put a hole in any other part of the balloon as you do this. Also make sure that you do not lose the hole after you make it; it's hard to find if you do.

Stretch the little tiny hole in the balloon down over the lug. Make sure that when you are finished you can see some of the balloon all the way around on the lug side of the rubber band. At least some putty will have squeezed out of the hole (if not, you might not have a seal); form it back into the hole, and discard any excess.

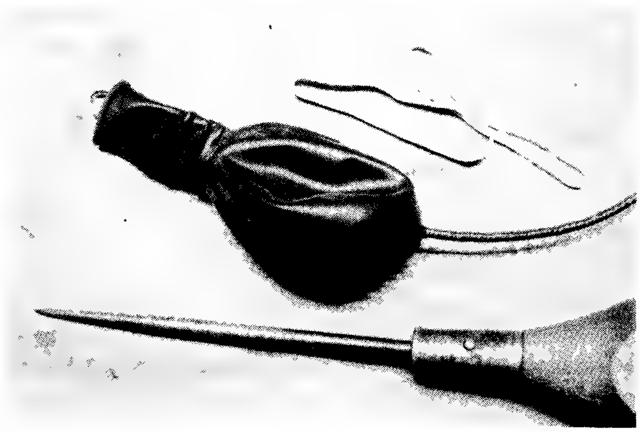
Pull the mouth of the balloon up over the puller. Leave in as much slack as you can, but make sure you have enough balloon above the base of the lug to make a good seal. Squeeze out any excess air. Then seal it around the lug with a rubber band, as described above for the match books.

To make sure you are able to make one waterproof before depending on one, tie a weight (i.e., bolt) to one and set it under water overnight. If it works when you try it the next day, you know you are able to make one waterproof. If you see bubbles coming off of it when you set it in the water, it probably isn't waterproof.

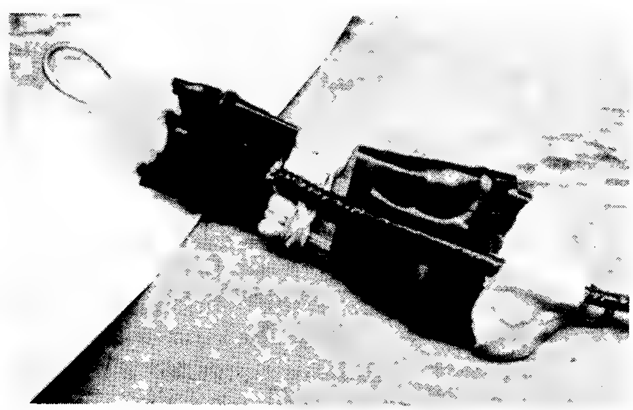
If you use plastic wrap instead of a balloon, the piece of plastic needs to be big enough in both dimensions that it can be formed like a bag over the igniter. A twelve inch wide roll isn't quite wide enough. If you use a plastic bag, a typical sandwich bag isn't quite big enough. Make sure that whatever you use is big enough that you can have excess material on the lug side of both rubber bands, and that you can leave slack. Make sure also that there are no extra holes in the jacket.

This jacket is put on essentially the same as the balloon; the puller lug goes through a small hole in the center of the plastic, and the rest is wrapped up and around the igniter and puller, coming together at the other lug. Slack is put into the plastic by bunching it up toward the puller. Excess is cut off, making sure that all edges will reach well above the rubber band.

Plastic wrap does not make as good a jacket as a balloon. An igniter with a plastic jacket should be thought of more as water-resistant than waterproof.



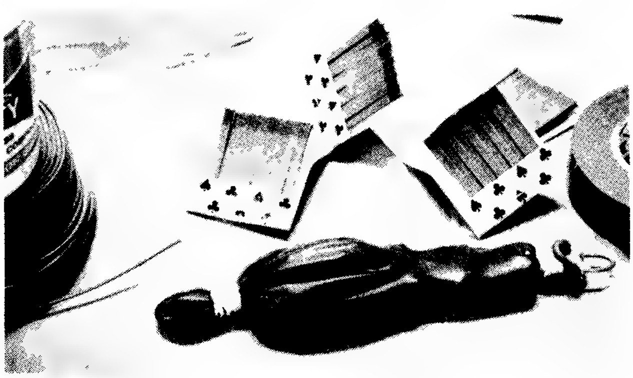
Tape a few more match books around the igniter over the fuse. Then run the fuse out through a tiny hole in the bottom. Stretch the mouth wide open, and pull the balloon up over the igniter, until the bottom lug is against the hole.



Mold Plumbers' putty around the straight part of both lugs, between the igniter and the eyes; use plenty. Cover the fuse along with the lug where the two run together. Insert the end of the fuse through the mouth of a balloon.

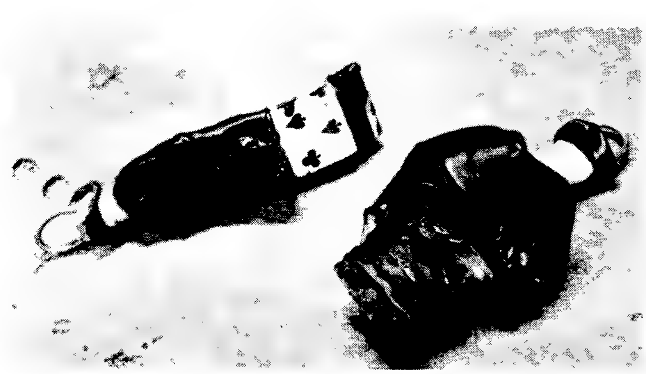
Wrap one or more rubber bands very tight around the base of the lug and fuse, then pull the lug through the tiny hole in the balloon. Squeeze out excess air, and wrap a rubber band tight around the neck of the balloon and its lug. Make sure some balloon can be seen extending past the rubber bands at both ends of the igniter. The waterproof fuse-lighter is complete at this point.

Work station set up for waterproofing matchbook igniters. To simplify dumping match heads into a balloon, a funnel is inserted into the mouth; the handle of a pair of scissors holds it in place. The heads of at least four books should be used.



After the match heads are dumped in, the igniter is inserted into the balloon. Excess air is squeezed out, and a rubber band is wrapped tight around the base of both lugs.

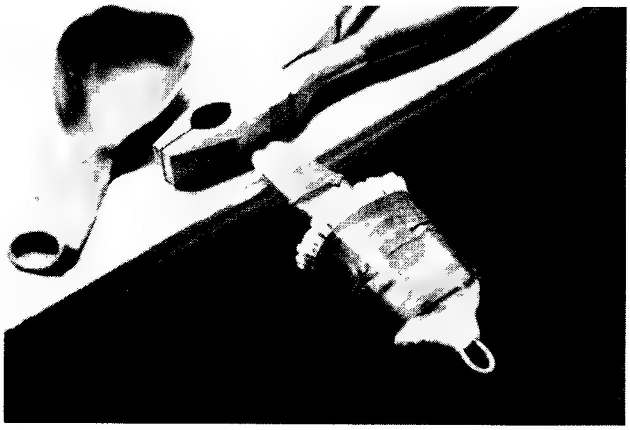
The balloon is cut to expose the lug; make sure balloon material can be seen extending past the rubber band all the way around. The igniter is now waterproof, and ready to be used.



When the igniter is activated, the match heads burn through the balloon. The balloon, tape, and match sticks all become fuel. This fuel had just begun burning when it was put out. Both sections of balloon burn and become sticky.

Waterproofing an Expanded Matchbook Igniter

It is usually best to cut off match heads, but leaving the match sticks intact will result in a longer secondary fire. In order to burn through the balloon reliably, four or more additional match books need to be used.



Use a weight to hold the igniter extended out over the edge of a table.

Wrap one or more rubber bands tight around the base of the lug at the bottom of the balloon, then poke a hole in the balloon and pull the lug through. Wrap one or more rubber bands around the neck of the balloon and striker lug. At this point the igniter is waterproof.

Stretch the balloon open wide with your fingers, and pull it over the igniter.

MATCH HEAD IGNITERS

The matchbook igniter works so well and is so easy to make that there will rarely be a reason to go to the trouble of cutting the heads off matches. But if you want to get the maximum amount of flash out of whatever size igniter you make, this is how to do it, though it is almost as efficient to simply add match heads or flash powder around the match book igniter described previously, and it's easier to adjust tension when you have two rows of match heads held together as a book than with a bunch of random heads packed together. This igniter does not flash for a significantly longer time than the match book igniter; it just flashes a lot bigger for its size

The match head igniter is essentially the same as the matchbook igniter, except that the match heads are cut off their sticks. Instead of an inner core holding two rows of match heads securely together, heads are packed at random. The striker-puller assembly is the same, except that the two halves of it are glued or taped together before assembly, to keep match heads from getting between them.

You need a vessel to contain the match heads. A toilet paper roll (with or without paper on it) works well. The box book matches come in can be cut and built into a suitable vessel; the same can be done with the covers that are removed from the match books.

If you want all of the fire to blow out the top of the igniter, you don't need to make any holes in the vessel; the hole for the striker-puller is enough. If you want fire to blow out the sides and/or bottom, punch or cut holes in those areas. Make sure the holes are not big enough for match heads to fall through.

If the igniter is going to be made waterproof and unless it will be taped or lashed to something, it needs a lug. There are many ways for one to be made and attached, depending on the shape of the vessel. Tie wire makes the best lugs, especially if you intend to waterproof the device. Secure the wire through the walls of the vessel and wrap a lot of tape around the walls to make them strong. Shape the wire so that a small neck extends from the center of the bottom of the igniter and ends in an eye, as described for the match book igniter. Make sure any wire on the inside doesn't interfere with the striker.

Use heavy-duty scissors or wire cutters to cut the heads off the matches of enough books to fill your vessel; take into account anything that will be mixed with them. Make the cut right at the point the match heads and sticks meet.

Make a striker according to the directions for the match book igniter. After making the longitudinal fold, use tape or glue to secure the two halves together and seal the opening. If you want to add a lug to the striker, it is easier and safer to do it before the striker is inserted into the igniter.

Set the striker in the center of the vessel, with the puller extending up out of the top. Fill the vessel with match heads, making sure the striker stays centered. Shake and tap on the vessel to get the match heads settled together. Pack them down slightly. Be very careful not to move the striker and match heads against each other, or the device might go off in your hands and face.

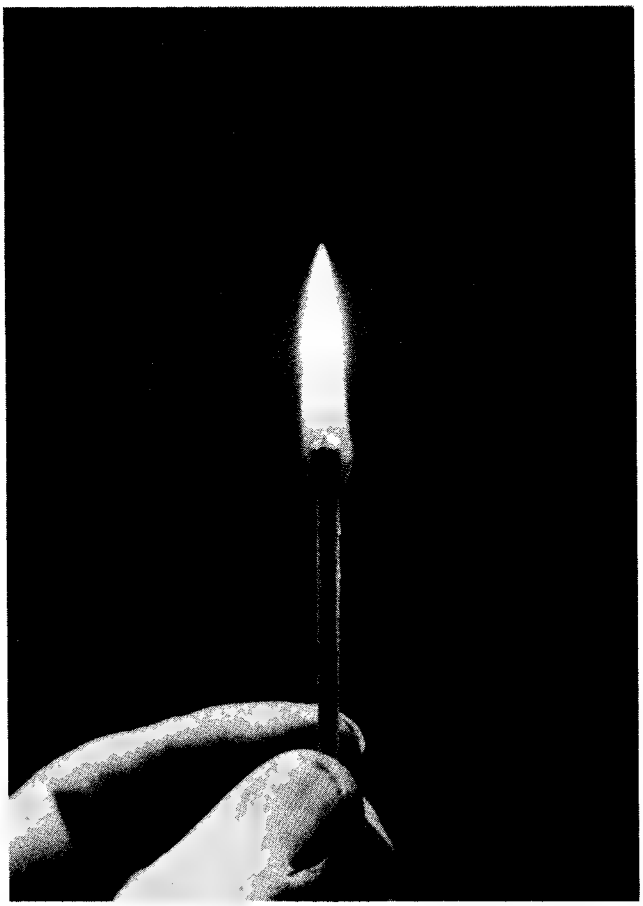
When the vessel is filled to within an inch of the top, fill it the rest of the way with tissue paper or some other wadding material, stuffing it down so that it fills all voids, and makes a sleeve around the striker-puller. Put moderate pressure on the match heads as you stuff in the wadding; be careful not to make the device flare up in your face as you stuff it. Use glue or tape to secure the wadding, but make sure nothing gets on the striker that will make it stick to the wadding.

At this point the igniter is armed. The instructions on how to improve the match book igniter can be adapted to it; this includes waterproofing.

Matchbook igniters and rigging material can be carried easily and safely in a match box, among other places.

STRIKE-ANYWHERE MATCHES

Unlike paper matches that come in a book, these have everything they need in each unit to produce fire when friction is applied. They do not require the use of their own special striker. This is why they are called strike-anywhere matches. The name is a vast overstatement. There are a few important limits on where they can be struck: it must be a solid surface; it must be dry or nearly so, and it has to be within certain tolerances of flatness and abrasiveness.



Stick matches have served man as factory-made igniters for well over a century. Though they are primitive next to their peer the butane lighter, they are still very good igniters: they are low-cost, common, reliable, and effective. There are ways to improve them.

ONE-HANDED LIGHTING

Lighting a so-called strike-anywhere match with one hand is not a difficult thing: it can be struck against any dry surface of the right texture, from a zipper to a cement floor. As many people know, stick matches can be lit easily by being thrown down hard against a clean, dry sidewalk.

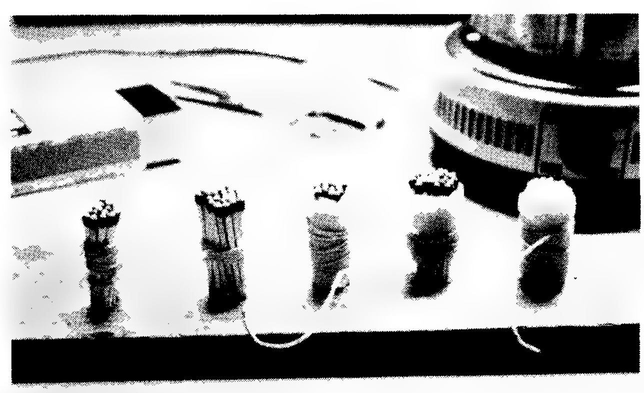
A hand can also provide a striking surface on its own, by holding a match stick with the fingers as the thumbnail strikes across the head.

BIG MATCH

For a big match stick with a bigger flame and longer burn time than a single match, bundle several match sticks together into one big fat match. Make sure all the heads are at the same end and all are on the same level, and hold them tight together with a rubber band or string (or both). Strike it the same as you would strike a single match.

This big match can be waterproofed and its burn time extended by dipping it in melted paraffin. Melted wax will probably break a rubber band, so you have to use string to hold them in a bundle if you want to dip them. The match sticks won't absorb much if any paraffin, but they will be coated by it, as will the string that binds them.

When you strike this match the striking surface will rub the wax off the heads and then they will strike. So make sure you don't get too much wax on the heads, unless you will have a good cement floor or wall to strike it on. If you only dip it once or twice and stand it with the heads up to dry you won't get much wax on the heads.



These big matches have been dipped in paraffin and stood to dry on a two-by-four. The one on the far right is stood to dry with the match heads down; it will be a little harder to strike, but will also hold more paraffin.

To further extend burn time and increase the size of the long-term fire, wrap strips of absorbent paper (i.e., paper towels, etc.) around the matches and secure the strips with string before dipping. This will produce a combination super match and firebug (as described in chapter 2). Don't add so much paper that the match can't be manipulated easily.

One or more of these super matches can be carried safely in a match box, along with single matches.

Two big matches, dipped, cooled, and with their strings trimmed The one on the left will make a bigger initial fire because it has more matches; the one on the right will burn longer because it is surrounded by paper-soaked paraffin.

MATCH STICK IGNITER

Stick matches can be used in a few ways to make an igniter. They are not as convenient as their paper cousins in books, but they will work. Rigging is more complicated with them. They can be made waterproof, but the rigging then becomes more complicated, because more weight has to fall a greater distance.

These matches need to be struck against a rough surface, such as a brick, cement wall or floor, sandpaper, or the striker that comes on the package. There are many ways for this to be accomplished; two will be given in detail.

USING A BOLT

Match sticks can be glued, taped, tied, wired, or rubber-banded to a bolt, in such a way that when the bolt is suspended by a line and the line is released, the bolt will drop, develop momentum, and drive into a flat, hard, rough surface, with the match heads being at the leading edge. A detailed description of the rigging involved in this is beyond the scope of this book; it is covered in greater detail in *The Black Book of Boobytraps*, by me. These instructions can be modified and used with things ranging from pipes to bricks.

Many sizes of bolt will work; the size determines how far the device will have to fall to be activated: a heavier bolt won't have to fall as far. A three-eighths by two inch machine bolt will fire reliably if it falls three feet.

It is very important that the match sticks be attached securely enough to the bolt that they don't slide when they fall against the striker; they need the bolt's momentum. The easiest and most secure way to accomplish this is to use a bolt that is the right length or a nut and bolt that is threaded all the way. Set the match sticks with their wood ends against the inside of the bolt head and alongside the bolt if the bolt is short enough for the match heads to extend past the end of it. If the bolt is too long for that but is threaded all the way the same thing can be done with a nut; set the nut so that the nonstriking end of the match sticks is against it when the sticks lay alongside the bolt.

Select match sticks with large, well-formed heads and straight sticks

One match stick alone will ignite, and can transfer its fire to the next medium. But matches are cheap, and multiple match sticks will increase reliability and make a bigger fire. They are easiest to secure to the bolt three or so at a time. Secure both ends and the middle, using rubber bands, tape, string, glue, or wire. Set matches all the way around the bolt, making sure that all of the ends touch the head so they can't slide. If there is no bolt head or nut for them to push against, secure them just a few at a time and wrap them tightly for a friction hold.

After the first ring of matches is secured to the bolt, as many more as desired can be added. The first ring of match heads has to be the leading edge, so that it is what strikes the surface; all

added match heads must be set behind that ring. Add several rows, for a big flash followed by a bundle of little sticks burning. If you are going to make the device waterproof with a balloon, do not let match ends stick out beyond the bolt head; cut them off if necessary.

Things like black powder or thermate can be added to the device to increase power, as long as rigging and the leading ring of match heads are not interfered with. For more on this see the previous sections "Increasing Power" and "Extending Burn Time" for the match book igniter.

The bolt is hung from the head end, with the match heads hanging down. Since matches do not need to strike straight into the striking surface, it doesn't need to hang exactly vertical. This simplifies rigging, because the load line (line temporarily supporting the load) doesn't need to lead off the exact center of the top. Simply tie the line around the bolt under the head. Hanging from this point the device will hang and fall at an angle, but it will work fine, as long as the angle is not too severe. It should be between forty-five and ninety degrees, preferably closer to ninety.

It's better if it hangs straight, because more match heads will hit the surface, but it works well enough without going to the trouble of rigging from the center of the bolt head. If you have tape or string and are good with knots it isn't a lot of trouble though. If you have string, tie both ends of a piece several inches long in clove hitches that lead off opposite sides of the bolt head, using half hitches to hold the two in place opposite each other. Then tape it in place.

The load line can be light string, sewing thread, or fishing line; anything heavier might rob power from the falling igniter and make it fail (unless you add weight to the igniter to compensate). The line runs to an overhead anchor, where it turns and leads to a boobytrap or timing device; the line holds the load hanging suspended from the anchor; when the line is released (at any point), the load falls. This overhead anchor can be a light fixture, a pipe, a bent nail, or a number of other things. Try a few practice runs without the matches to make sure your rigging doesn't get tangled up.

The device has to fall against a clean, flat, hard surface, as similar in texture as you can find to the striker on the box. This can be a cement floor, a brick, or a piece of sandpaper, among other things. The striking surface doesn't need to be very big; just be sure you hit it.

If you have a clean cement floor for a striking surface you can hang the striker anywhere, but you still need to know exactly where the igniter will hit if you want to set tinder next to it. If you have a smaller surface, such as a brick, you need to be sure you hit it.

To find out where the igniter will hit when it falls, let the load line down far enough that the device hangs an inch or so above the surface it is intended to hit. Whatever it hangs over at that point is what it will hit when it falls, providing the overhead anchor doesn't move (as in the line sliding along a pipe, for example).

A fuse can be added to this device, but it must be added in such a way that it does not affect the fall. This means it has to be pretty long, and the bolt has to be heavy relative to the fuse. Fuse does not make good rigging line.

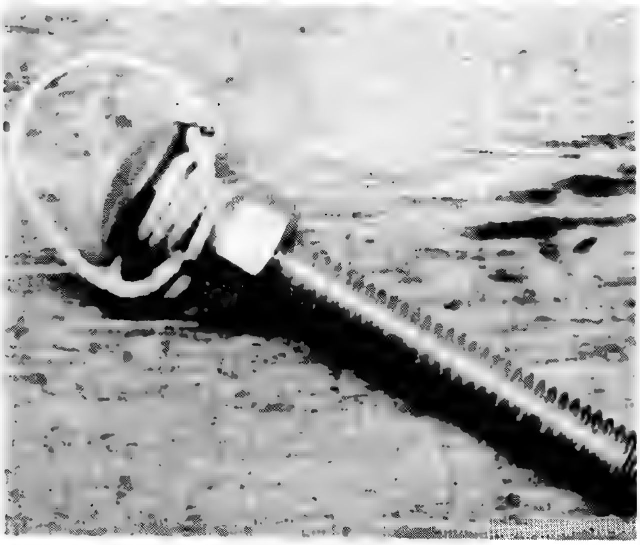
To transfer fire from the device to the secondary fuel, find out where the igniter will end up after it falls. Do this by making a few trial runs with it, using matches that have had the heads removed (unless there is no problem with leaving a strong smell of smoke in the air, in which case leave the heads on, to test the device). See where it falls. It will probably not end up in exactly the same place every time, but it will end up in a general area. Cover that area with a bed of matches or other tinder.

WATERPROOFING

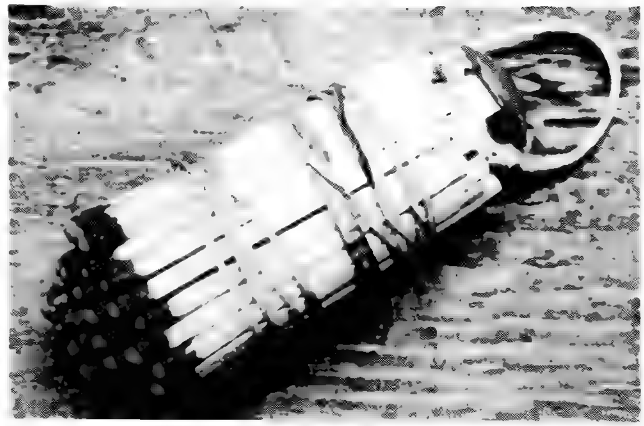
To make this igniter waterproof, both the matches and striking surface need to be kept dry, and they need to be brought together. Any waterproofing agent (i.e., balloon, wax) would have to be applied to both, and the force of the fall would have to be sufficient to penetrate both. This much force would be likely to break the matches first. And anything like wax on the striking surface would render the surface smooth.

In spite of the above, this igniter can be made waterproof, by setting a striking surface next to the match tips, where it can be kept inside the jacket with the match heads. It is done with a piece of medium grit sandpaper and a balloon. Setting the match heads right on their striker and cushioning the fall with a deflated balloon make the device relatively inefficient, so a bigger bolt needs to be used and it needs to fall farther.

Match Stick/Bolt Igniter



The best bolt to use is one that is threaded all the way. A nut is set to give the base of the match sticks something to push against, like a hand against the cross-guard of a knife. Tie the two ends of a short string to the bolt just under the head; this makes it easy to hang the bolt.

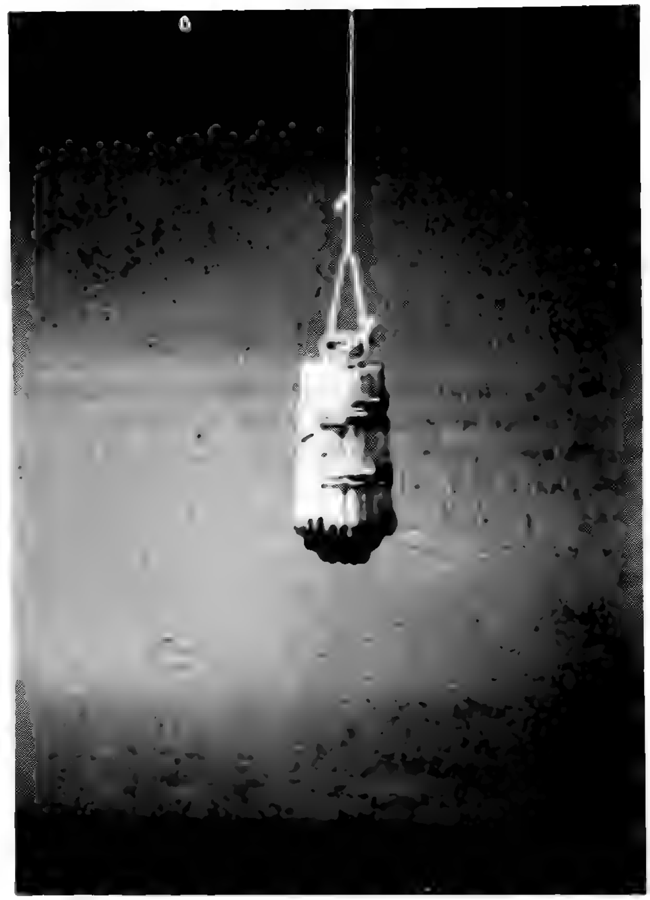


Completely surround the bolt with a row of match sticks. Then add more rows of matches, all slightly behind the first row, so that the heads of the first row form a leading edge. At this point the igniter is ready to be hung.

Tape, tie, or rubber-band matches to the bolt, with their base touching the nut and their head extending just past the end of the bolt.

The igniter is hung over a brick; tinder is set where it will catch fire from the igniter no matter where it falls and rolls (one more fire-starting log will be added in front). The igniter is hung from a long load line suspended barely over the brick, to see where to set everything. Then it is raised several feet, and the load line is attached to a timer, boobytrap, or remote trigger.

It is important that the match heads have a good, solid surface to strike against. Tinder needs to be set close to where it will land. Tape the match sticks to the brick if you can.



After everything is set in the right place, the igniter is hung several feet above the striker. The load line is run to a timer, boobytrap, or remote. To be sure your rigging will not hang up and make the load swing, test it before arming the device. Keep the load line as light as possible.

It is difficult to waterproof this device so that it will work reliably. So before you ever rely on one, be sure you have made and tested enough that you know what you're doing. A matchbook igniter is much better if you have the material for it.

Cut a strip of sandpaper to a width equal to the diameter of the outermost ring of matches, and long enough that it can lay over the match heads and along opposite sides of the sticks. Wrap it carefully over the tips of the matches, and down both sides, with the tips of many matches touching or close to the grit side of it. Secure the strip in place with a rubber band or tape.

At least a few extra full rows of match sticks need to be attached outside of the sandpaper strip, to burn through the balloon. They should be set in rows, starting just under but touching the leading match heads, then just under that row, and so on up the bolt. Do not let match sticks extend above the bolt head, or they might tear the balloon; shorten sticks if necessary.

Set the device with the head down and matches up on a table; it should stand on its own. Open the mouth of a balloon wide with your fingers, and pull it down over the igniter, until the sandpaper covering the match tips is against the bottom inside of the balloon. Turn the igniter over, and pull the rest of the balloon over it. Work rubber over bulges so as to center the balloon mouth and neck over the center of the bolt head. Tie a knot in the balloon.

The igniter is waterproof at this point. Tie a load line to the balloon under the knot and it is ready to hang. Hang it all the way to the ceiling so that it will hit hard.

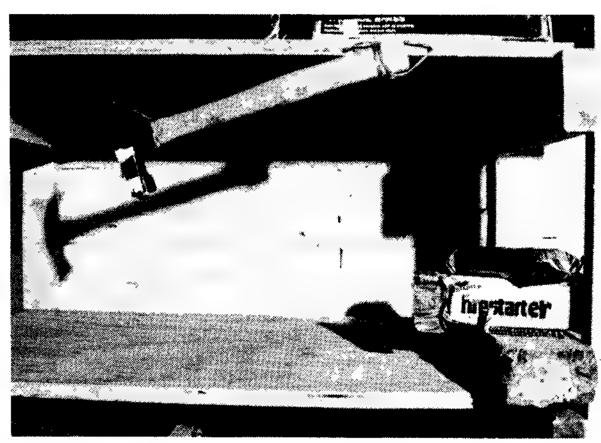
USING A HAMMER

The same thing that can be done with a bolt falling can be done with a hammer swinging, except that the hammer can not be made waterproof as easily. Since the hammer hangs from a fixed point after the device is activated, it is easier to know and control where the fire will go.

A carpenter's hammer works well for this; the instructions can be modified for use with things ranging from an ax to a brick. There are a few ways a hammer can be rigged; one will be given. Stick a piece of duct tape several inches long to one side at the bottom of the handle, with a few inches stuck to the handle, and the rest extending past the handle, in a straight line with the handle. Leave three inches or so of slack, and stick the other end of the piece of duct tape to the opposite side of the handle.

Form the slack you left carefully over the end of the handle from both sides, until the tape comes together in the center, making a straight line between the nail-puller and head; stick that tape together, forming a tab leading off the center of the end of the handle. Make sure the tab is in

Match sticks are attached very securely to a hammer head, with the match heads forming the leading edge. More rubber bands and/or tape will be added, to make sure the matches don't slide. Many more matches are then added, behind the leading edge.



Match Stick/Hammer Igniter. With the hammer hanging from its pivot point, the matches and brick are set. More matches and other expanders are set where the fire will easily reach them. The hammer is raised; when the load line is released, the hammer will fall and strike fire. The load line is run to a timer, boobytrap, or remote trigger.

the center, and in a straight line with the direction the hammer will swing. Wrap tape around the handle a few times to secure the tab to it.

One match will work but more are better and more reliable; three fit well together on a hammer head. Glue, tape, or rubber band the three matches to a side of the hammer head, with their tips a quarter- or half-inch in front of the striking surface of the hammer, so that when the hammer swings in its normal manner, they will hit first.

Add more matches, keeping them behind but in contact with the first three, which form the leading edge. If you want you can cover the entire hammer with match sticks, as long as you don't interfere with the three leading-edge matches or the rigging.

Drive a nail through the center of the duct tape tab and into whatever you want the hammer to hang from (i.e., table leg, wall). Leave the nail extending out away from the wall far enough that the hammer can swing freely from it.

Set a brick or something else with a suitable surface so that the tips of the matches barely touch it when the hammer hangs straight down. Turn the brick a little so that the match tips will slide over it when they hit; a little angle is enough. The way you turn the brick will determine where the hammer head and its fire end up after the device is activated.

The load line is tied around the handle, just under the head, leading off the back of the handle, directly under the nail-puller. The pulley it is hung from can be as high up as a pipe running along the ceiling, or something like the back of a wooden chair, as long as it is in the right place for the hammer to swing straight into its striker. When the line raises the hammer into the cocked position, the line should run through the nail-puller; this will insure that the hammer is hanging straight, and the matches will drive into their striking surface.

A fuse can be taped or tied to the matches, as long as it has enough slack in it and it is set so that it does not affect the mechanism.

To transfer fire from the igniter to the next fuel, see where the hammer head will end up after the device is activated. Do this by making a few dry runs, using match sticks with the heads cut off. Usually it will bounce around a little, then come to rest next to the brick. Tape many match sticks to the brick anywhere the head might come to rest, and continue the line of match sticks on to the secondary fuel.

The hammer can be covered with match sticks, and it can also have a secondary fuel taped or tied to it, as long as it doesn't get in the way. A fire starting log can be lashed to the handle, for example.

This igniter can not easily be made waterproof, unless a tent is built around it. Since the tent would stop or inhibit oxygen, a means would need to be set to burn through it right away. Match heads or other fuel/oxidizer mixes should be used. The tent then becomes a component of secondary fuel.

CHEMICAL SYSTEMS

Some chemicals react when mixed together by burning or producing heat. These can be used to initiate fire. Chemicals are usually more difficult to obtain and harder to work with than matches; some are easier to get than others. Their use in incendiary systems is usually as timers.

The fire or heat produced by chemicals can be transferred to the next medium in a few ways. Powders are piled next to, on, or preferably under secondary fuel. The powder is treated as tinder, and the chemical poured on it is the match. Buckets of self-igniting oiled rags are another version of the same combination. Sometimes one chemical is placed in a small jar inside a bigger jar of the other chemical, and the grenade is thrown or dropped so that both bottles break and the chemicals mix.

If there is time, it is a good idea to test the chemicals you intend to use. Test small amounts at first. Then test larger amounts, to see how long they will take to produce fire, and how big the fire will be. Make your testing environment as similar as you can to the target environment, in regard to temperature, humidity, and air movement. Make sure your chemicals will produce fire under those conditions, and make sure the fire is big enough to do what you want it to do.

Mixing chemicals, especially of the type given here, can be very dangerous. Anyone who does it without wearing eye protection is a fool (except in very desperate situations where none is available). It should be done in well ventilated areas or outdoors, and anyone close to the chemicals must be careful not to breathe any fumes. It should be done in an orderly manner, by a sober adult.

OXIDIZER/FUEL MIX

Fire is oxidation, and sometimes when fuel is brought into contact with an oxidizing agent, the two produce their own oxidation, often pretty dramatically. For a list and description of oxidizing agents, see Chapter 3, under the subhead Oxidizers.

Calcium hypochlorite is commonly sold in hardware stores as a disinfectant for swimming pools, and is also sometimes used by water utilities to chlorinate drinking water. It is a powerful oxidizing agent that reacts with many organic fuels, causing spontaneous combustion when the fuel and oxidizer come together.

According to *The Investigation of Fires*, "Two tablespoons of brake fluid poured into a can containing about two cups of calcium hypochlorite will send a sheet of bright red-orange flame four to six feet in the air.... Depending upon the temperature, humidity, and wind conditions, the ignition will take place in from 45 seconds to just under five minutes." Drier air, higher temperature, and less wind will speed the reaction; the opposite conditions will slow it.

Other fuels that are reported to react the same way with calcium hypochlorite are charcoal, ethyl alcohol, glycerol, grease, oil, tobacco, and turpentine.

Different fuels react with different oxidizers. Some will react with just about any oxidizer; these include: diesel fuel, fuel oil, oil-soaked cotton, paper, pine oil, powdered rubber, and sawdust. Test any you intend to use.

To use this type of igniter, pile secondary fuel above it, then pour on the other chemical, or use a timer or boobytrap device.

PYROPHORIC CHEMICALS

Some chemicals burn spontaneously when they come in contact with air; this property is referred to as pyrophoric. These substances have to be stored immersed in water or a solvent. When removed from the water or solvent, they will burn.

The most commonly-used pyrophoric chemical is white phosphorous. It is often mixed with military incendiary weapons (i.e., napalm) as an igniter. Getting and using this material is fairly complicated and will not be covered in this book; use of white phosphorous is covered in some detail in TM 31-201-1.

SPONTANEOUS COMBUSTION

Some combined materials will produce heat on their own under the right conditions. Usually the heat is given off as fast as it is produced, but sometimes instead it is contained, and builds up to the point that it burns. Some accidental fires begin this way.

An army manual on incendiaries, TM 31-201-1, has a detailed section on spontaneous combustion. Their instructions are a little complicated and use hard to find materials. This book will give information on how spontaneous combustion occurs naturally, with more common materials.

In order for spontaneous combustion to take place, something has to produce heat, the thing that produces the heat has to be able to be fed by atmospheric oxygen, and the heat has to be contained. Usually the best way to accomplish this is to put the material into a pile or bale, or a trash can or bucket with the top open. Dry, still air and high ambient temperatures increase the likelihood of ignition.

The most well known spontaneous combustion combination is rags soaked with oil and piled or baled together loosely. The oil has to be animal or vegetable; mineral oil will not work. The rags can be any absorbent material that will burn; cotton is ideal. It can be clothing, bedding, actual rags, or a number of other things. If some of the rags have been charred, the possibility of ignition seems to be increased.

Cod liver oil, fish oil, fish scrap, and linseed oil are given as "extremely dangerous" (*Fire Protection Handbook*). Corn oil, olive oil, and soybean oil are given as having only a moderate tendency to heat. Lard oil and oleo oil have only a slight tendency.

If the pile or bale is too tight, air can not circulate, and there will probably be no fire. Pile saturated rags or other material loosely into a corner or trash can. Make sure air can get to it, but protect it from a breeze that might carry heat away. Set secondary fuel over the pile.

Charcoal that has been soaked with water will produce heat as the water evaporates. This is given as having a high tendency to burn spontaneously; it sometimes leads to fires in garages, where charcoal is usually stored.

POTASSIUM CHLORATE/SUGAR

A common, well known igniter is made by

mixing an oxidizer, potassium (or sodium) chlorate, with a fuel, table sugar. The two are mixed by filling a glass jar half full with equal proportions of each, putting the lid on the jar, and rolling the jar on its side until the two are mixed. Once mixed, this will catch fire easily, and burn hot and fast. Treat it as carefully as you would treat black powder.

SULFURIC ACID

Concentrated sulfuric acid will char many things and reliably cause some things to burst into flame when it comes in contact with them. This includes the potassium chlorate/sugar mix described above, and match heads, among other things. This is useful for timer and boobytrap devices, where the acid can be dumped on the powder, or placed in a bottle that breaks over it.

Sulfuric acid, especially in a concentrated condition, is very dangerous to work with, because it eats through many things, and reacts violently with many things. It should be stored and carried in a glass jar with a glass lid or stopper. Wear eye protection whenever you handle it; rubber gloves and heavy aprons are also a good idea. If you get any on yourself, wash it off right away with large amounts of water. If you ever mix acid and water, add the acid to the water, not the other way around.

If all you can get is weak sulfuric acid, it can be concentrated by being heated in an enameled or porcelain pot. This must be done outside or in a very well ventilated area, because acid fumes are very dangerous. When the acid solution being heated begins to give off white fumes, the acid is sufficiently concentrated. Don't breathe the fumes.

THE GUIDE TO CHEMICAL FIRE-STARTING

Many other chemical mixtures that will lead to ignition can be found by looking through a book put out by the National Fire Protection Association (NFPA), titled *Fire Protection Guide on Hazardous Materials*. You should be able to find a copy of this book at most fire stations, you can buy a copy, or you can get one from a library, probably through interlibrary loan.

This book and others like it should be studied carefully before using dangerous chemicals; learning all the combinations is a side benefit.

ELECTRICITY

Accidental fires initiated by electricity are typically caused by bad wire connections, insufficient or worn wire, malfunctioning equipment, ignorance, and idiocy. For a fireman who knows something about electricity, the conditions leading to these fires can be duplicated. With some skill at wiring, a fire started by this device can be made to appear accidental. Timer and boobytrap devices are relatively easy to make.

The fireman who wants to use electricity should become an electrician; that is, one who works with electricity. A professional master electrician can use the weapon very skillfully. Anyone else should study books and do home improvement and hobby work with it to get to know it. There are many good books on the subject at most libraries and book stores. With them and this book, rigging an electronic trigger is no more difficult than putting a new socket on a lamp.

Electricity, like the other forces in this book, is very dangerous to work with if you don't know what you're doing. So study it before you work with it. Make sure a circuit is off before you work on any part of it. And be aware of what things can conduct electricity, such as a wet floor, and what it means to complete a circuit.

The use of electrical igniters requires that there be a source of electricity. Virtually every building in the modern world has this, and it is almost always on. Where there is no electric service, one can be supplied with batteries, ranging from flashlight size to automobile size and bigger. If there is a possibility that the electricity in a building will be turned off, as in war, or if the target of a boobytrap might be suspicious, batteries should be used.

FUSES AND CIRCUIT BREAKERS

Buildings are protected from fires and other electrical hazards by fuses or circuit breakers, that shut off the flow of electricity before a fault starts a fire. Fuses are found in older buildings; circuit breakers are found in newer ones. Both do a fairly good job of preventing accidental electrical fires, but such fires still occur in spite of them, and they can be circumvented, if not defeated.

Fuses can be defeated in a number of ways. The most well known is to insert a penny behind the fuse. Sometimes the glass on a fuse is broken out and the fuse interior is stuffed full of tin foil.

Sometimes a fuse is thrown into a washing machine with clothing; in time water fills the fuse (the water is hard to see from the outside). These and other means give the current a path to follow that will not burn out and stop the flow, as the fuse is intended to do.

It's amazing, but people have done and still do all of those things. If a fuse blows it means there is something wrong with the circuit that might start a fire; the stupidest thing in the world to do in a case like that is to defeat the thing that shuts the circuit off. Unless you want to start a fire. But people do it.

Circuit breakers are difficult or impossible to defeat, except by getting into the panel and wiring around them, which takes knowledge of wiring and is dangerous. They can be partially defeated by replacing the right sized breaker with one that is designed for bigger wire. This will allow overloaded wire to heat up to the point that it can start a fire. This is another stupid thing that people actually do sometimes.

IGNITION MECHANISMS

Bad wire connections cause fires by arcing. This happens where a conductor is broken, as at a switch or connection, and the two broken ends are close enough that electricity can jump across the air space between them; this current jumping across an air space is called an arc. It is the principle behind arc welding. As in welding, it produces a lot of concentrated heat. Usually the heat remains contained, but sometimes it spreads to nearby fuel.

Also as in welding, the gap between the conductors has to be just right to produce an arc. When wires come together, there is a point where they are the right distance apart, and an arc will be produced at that point. This is what happens when an appliance with a connection between the hot and cold wires in the wrong place (referred to as a short) is plugged into an outlet and when they come together they burn, producing a spark and tripping a breaker.

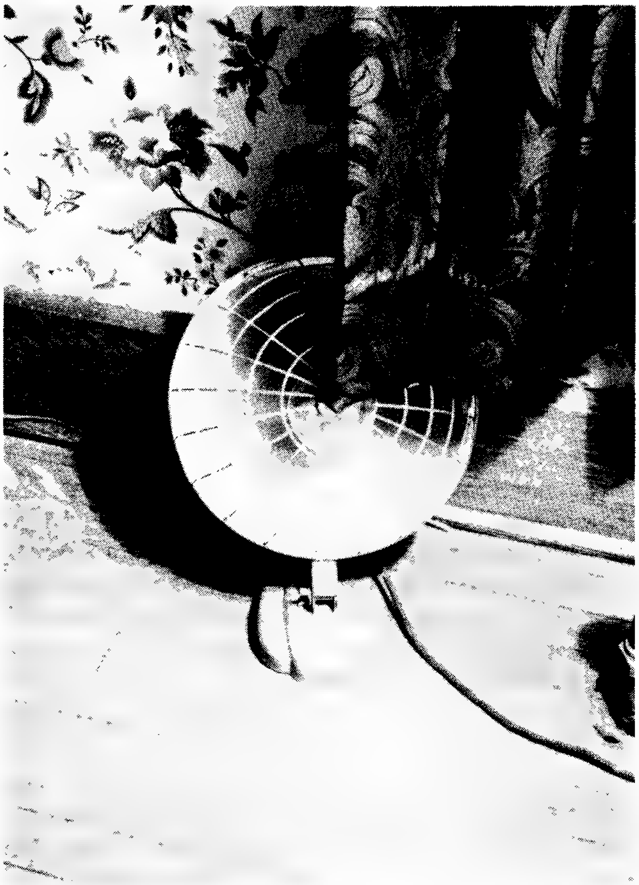
Insufficient wiring means wiring that has too small a diameter for the amount of electricity that runs through it. Such wire heats up, burns through the insulation, and sets fire to nearby fuel. This typically occurs with extension cords, which have either too many appliances connected to them or are too small for their one appliance. A cord that is bunched up or run under a rug will heat up more, because the heat is less able to dissipate.

A cord run under a rug is also likely to start a fire because it gets worn through from being walked on. Eventually some of the wires break, so that there is less wire carrying the current; the smaller the wire gets the hotter it gets, until it burns through the insulation and shorts out, causing a big spark that sometimes starts a fire.

A cause of fire referred to in one fire prevention manual as "extremely common" is an electric blanket left on and bunched up in a pile. This might be referred to as a fire caused by ignorance, because most people don't know that a bunched-up electric blanket can not give off its heat, and the concentrated heat will make it burn. Many people don't read safety instructions, because the instructions are typically 99% to 100% worthless, being comprised of information that anyone who can read already knows. Instructions are rarely written to prevent accidents; they are written to prevent lawsuits, and so are written for morons (idiots can't read).

Sometimes fires are caused by incandescent light bulbs coming either very close or into contact with fuel. The glass casing, or envelope as it

Someone has stupidly laid a flammable coat over a lamp shade, where it will trap the heat of the light bulb. A high-wattage bulb might also have been stupidly installed in the lamp. The lamp is close enough to flammable curtains to get them burning; the wallpaper will also burn. There will be a lot of smoke before flaming fire starts. Turn the light on just before you leave, or wait to make sure it starts to burn; it will take the fire a little while to develop.



An electric heater has stupidly been pushed back against a wall and a curtain is hanging against it. Many curtains are more or less fire-resistant, but not all. Accidental fires get started in this way. (Alcohol is often a factor.)

is called, can get very hot. The base also gets hot, but less so. As long as light bulbs are used in appropriate fixtures and nothing flammable gets close to them they are not much of a threat. But people don't always use things the way they are supposed to be used.

Light fixtures usually give a maximum wattage. If a bulb of higher wattage is used, enough heat might be generated to start a fire. Sometimes lamps fall over, leaving the bulb in direct contact with the shade or some other fabric, paper, or some other fuel. Sometimes people lay clothing over lamp shades to be dried, then forget about it. Clothing laid over a lampshade can form a ceiling that traps in heat, causing temperature to rise enough to start a fire. This type of fire could be said to be caused by idiocy.

Another type of fire caused by idiots is from improper use of electrical space heaters. Anybody should be able to see that the heating element is red hot, but people still sometimes set them close to fuel such as furniture and curtains, and even stupider people lay clothing over them to dry it out and then forget about it.

Other heat-producing appliances, such as clothes-smoothing irons, curling irons, and soldering irons have all started fires with the help of idiots who leave them lying on or very close to good fuel.

Many electrical devices are able to start fires if there is a good oxygen/fuel mix in the air, such as in the case of gas, vapor, and dust explosions. Electric motors in fans and other appliances make sparks that can start fires under ideal conditions. Switches often create an arc when they go on and off. Most people have experienced static electricity sparks by touching metal in dry air; such sparks will initiate a fire if conditions are right.

DELIBERATE ELECTRICAL FIRES

The mechanisms that lead to accidental electrical fires can be adapted for use in prefabricated ignition devices. Usually the fireman will use electricity to generate heat through resistance, which means juice flowing through a wire too thin to carry it without heating up. This is how light bulbs work (the filament is the thin wire), and it is how electric blasting caps work. There are many ways the mechanism can be employed. A few will be given below.

With so many electrical devices available, electric igniters give the fireman a great deal of control over when the fire starts. Once the igniter is set, all that is required is a switch, and there are a great many types of switches available. Timer switches, used to convince potential burglars that someone is at home by turning lights on and off, can be set for very precise and reliable timing. Motion-activated switches can be used to set boobytraps that have invisible triplines. Radio-controlled planes can start fires from a remote location.

Switches are simply devices that break one of the two lines of a circuit when in one position, and make the line unbroken in the other. They will be covered in Chapter 6.

RESISTANCE

A current running through a circuit generates heat; the amount of heat is determined by the ratio of current to resistance: the more current there is for the size of the wire, the hotter the wire will get. If there is enough current and the wire is thin enough, the wire will heat to the point that it can initiate fire.

This makes the use of electrical resistance to begin the combustion process relatively easy wherever there is a source of electricity, wires to channel it, and a thin wire to provide the right balance of conduction and resistance. Combinations of wires and energy sources come in many forms. Some come in packages where everything is already wired together and you only need to make a few adjustments; others are made from scratch with material from a variety of sources.

LIGHT BULBS

Since light bulbs start accidental fires, they can be used to start fires that appear accidental, by doing one of the things described previously.

A light bulb is the least hot when it is used with the base up. It gets hotter if it is horizontal or when the base is down. Since heat rises, the hottest part of the bulb is almost always the highest point on the bulb. The difference between bulb position and part of bulb can be hundreds of degrees. The top of the envelope of a 100 watt bulb with the base down can reach well over 400 degrees; higher wattage bulbs get even hotter, and heat bulbs get hotter yet. Mercury vapor and quartz lights get hotter than incandescent lights. Fluorescent lights don't get very hot.

Warm air temperature and things to confine the heat cause even higher temperatures at the surface of light bulbs.

If you don't need to make a fire appear accidental, bury the highest-wattage bulb you can find under a pile of flammable clothing. The clothing should be wadded up, not folded. The pile can be as big as you want, but the light bulb should be toward one edge, with the base visible, to be sure the fire can get air. The clothing will smolder and produce a lot of smoke for at least several minutes and might not do anything but smolder, though it will probably burn with a flame eventually.

If a smoldering fire with a lot of smoke and carbon monoxide is what you want, this can be a simple and useful timing device, allowing you several minutes to get out before more than a little smoke is produced, and longer before it becomes dangerous. It is very easy to use with an electrical timer, to give yourself even more time, and perhaps have the smoldering fire start after the occupants of a building are sound asleep. Leave doors and other passageways open if you can and disable smoke detectors.

If you want to be certain that the fire will produce flame more or less right away, without first producing a lot of smoke that might give it away, tape one or more books of matches to the bulb, with the match heads in direct contact with the highest point on the bulb; wrap paper around the bulb so that the matches won't fall off if the tape melts before they burn, and to carry fire from the matches to the next medium. The paper case the bulb came packaged in works even better than tape; it is the right size and works well as a sleeve, holding matches pressed tight against the bulb, then taking their fire.

An even more immediate igniter can be made from the filament with the glass out of the way, as explained below.

DIRECT-WIRING A LIGHT BULB

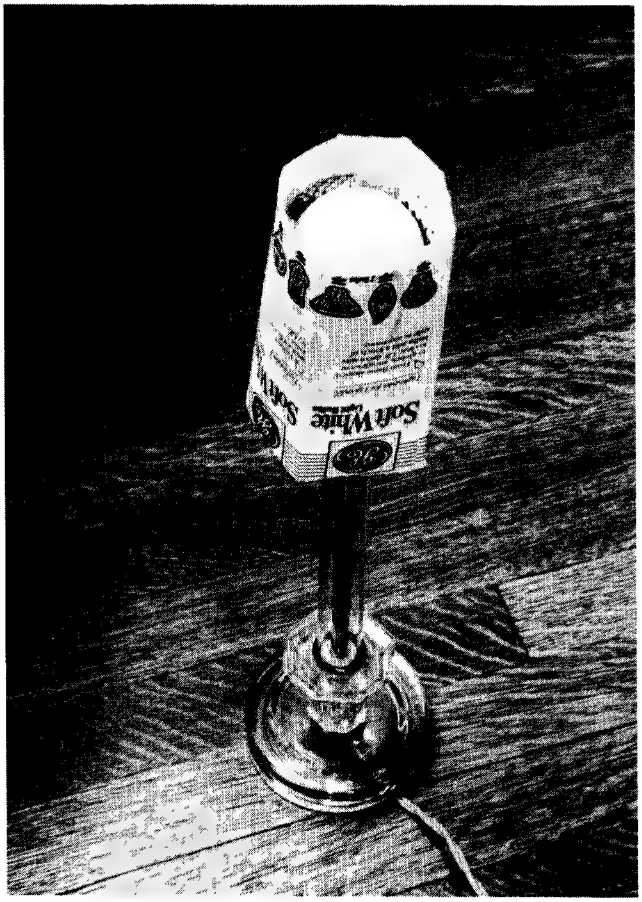
If you intend to break the bulb, make sure before you do that you have good connections. Wire it and then break it, not the other way around.

There are usually two points on the base of a bulb designed to have current run to them, typically the side and the bottom. Attach wire leads to your energy source (i.e., plug the cord in), and touch them to the contact areas of the bulb, making the light come on, to be sure you know where they go and that everything works.

Then attach leads securely to those points. Solder is the most secure if you know what you're doing, but tape, glue, and rubber bands can all be used; if you use glue, make sure none gets between the wire and its contact point. The easiest way is with electrical tape.

To wire an incandescent bulb, strip an inch or more from the ends of the two sections of a lamp cord. Wrap one stripped end partially around the threads, crossing over one or more threads, and tape it down securely. Bend the wire so that it runs away from the bottom of the bulb. Then wrap tape tight around the base a few times.

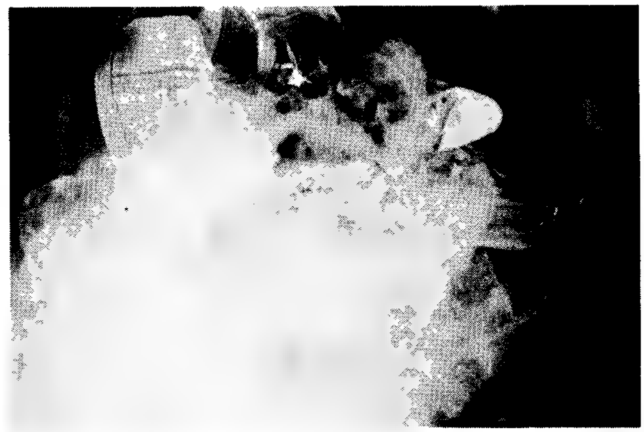
A quartz light, with or without the glass cover removed, will start a fire if the right fuel is piled on it. Usually there is a long period of smoldering and much smoke, followed by eventual flaming combustion.Here the light is set facing up in a laundry hamper; laundry is piled on it and plastic laundry baskets are piled on the laundry; more fuel will be piled just outside of the door. The chimney effect of the laundry chute and heat-concentrating effect of the steel laundry hamper should cause the fire to grow big and hot



A light bulb gets hot enough to start a fire. Setting match heads in direct contact with the bulb will make ignition much quicker and more reliable. The paper package light bulbs come in works very well for this; tape also works. Since it takes a minute or two for the bulb to heat up enough to light the matches, this easy-to-make igniter will give you time to exit the building before fire starts.

Use the highest-wattage bulb you can find, and make sure match heads touch the bulb. Then lay the lamp down, with one of the books of matches at the highest point; pile kindling over it, being careful not to break the bulb. Turn it on or plug it in just before you leave. Even with matches, there will be some smoking before ignition.

A light bulb buried in a pile of clothing will start a fire. This light is wired direct but it can just as easily be a lamp. Keep the bulb close to one edge of the pile so that the fire can get plenty of air. Set it where a draft will draw air from the side the bulb is on through the pile.



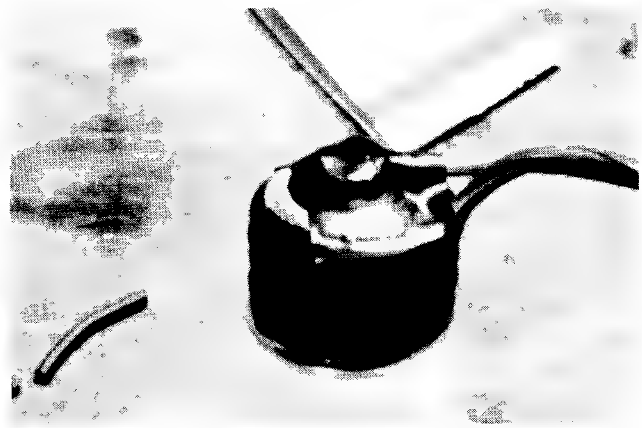
A light bulb buried in a pair of cotton overalls starts a smoldering fire that produces a lot of smoke.

Eventually the smoldering fire becomes a flaming fire.

Bend the other stripped end in half to make a section of bare wire that is twice as thick and half as long. With a strip of tape roughly two inches long, tape that wire to the contact point at the base of the bulb. Form the tape down securely with your fingers, making sure the wire is in good contact with the contact point. Then add another piece of tape to make it more secure. Be sure no bare part of that wire touches the part of the base with threads on it that the other wire is taped to. The light will be a little easier to work with if both wires run off the same part of the base.

The two contact points on a light bulb are the big metal threaded base and the round metal at the very end. They are separated by a ceramic ring.

Tape one wire to each of the two contact points; make sure a bare wire doesn't run between the two. Tape the wire to the threaded base first. The wire that is taped to the small contact point at the very end of the base is bent and spread, so that it will make good contact but will not go past the ceramic insulator.



After both wires are taped securely to their contact points, more tape is wrapped around the base to make them very secure. At this point the wiring is complete. Testing is easy. The bulb can be broken and its filament set in contact with tinder, or matches can be set in contact with the bulb, or the bulb can be buried in paper, cloth, or other tinder.

LIGHT BULB FILAMENTS

Light bulbs are commonly used as igniters by carefully breaking into or removing the glass envelope, and putting sensitive tinder into contact with the filament. Any bulb with a filament can be used for this, from an incandescent to a flashlight bulb. The filament will get white hot for a few seconds or so when the right amount of current is run through it, easily igniting sensitive tinder such as match heads.

Before you break the bulb, use the light bulb to test your wiring. If you can make the bulb light up, you can light matches with its filament. Once the bulb is broken the filament will burn out very quickly, so testing should be done with the bulb intact.

To break a bulb without getting broken glass all over the place, wrap tape around the bulb enough to cover most or all of the glass to within around an inch of the base, then hold the base with a plastic bag or soft paper or cloth wrapped around it and the bulb as you break the bulb.

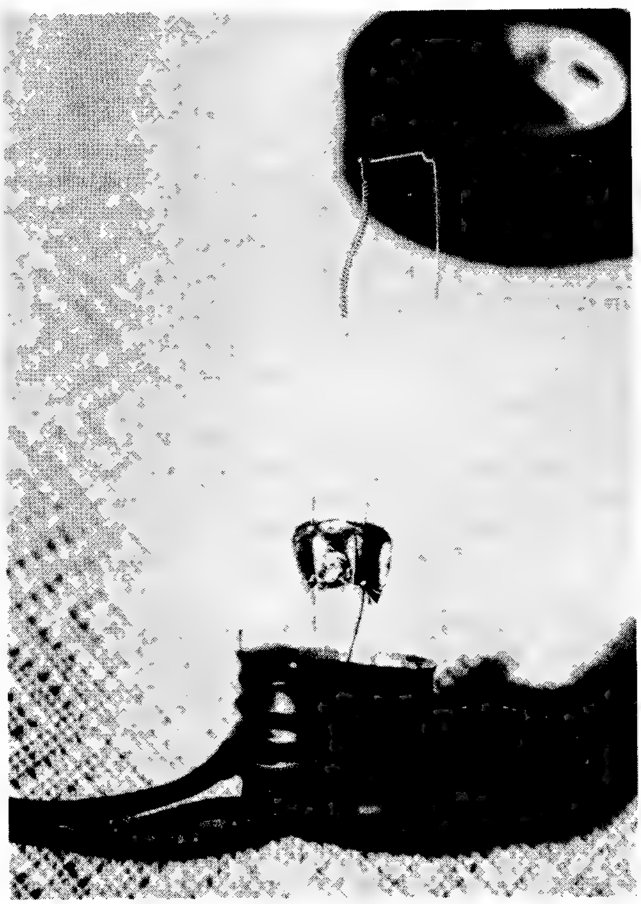
Be very careful that you don't break the fragile filament. Hold the bulb in its bag against a cement floor or some other hard surface, and tap the point opposite the floor with a hammer, heavy knife blade, brick, or some other improvised hammer. Continue tapping a little harder each time

until the glass breaks. Inspect the filament to make sure it is intact.

The filament is usually a spring, and so is not brittle, but it can break very easily, especially at the points it attaches to the wire leads. Be careful not to break it as you work with it.

If the filament is broken, it can still be used, though it is less secure. The filament runs between two thin wires. If you can lay the broken filament across those wires, the part of the filament that is between the wires will get hot. Bend the wires if you have to. If there is no filament, bend one of the two wires over until it contacts the other wire. This will not heat as well as a filament, but if everything but the filament is intact it will light matches.

It's best but not necessarily mandatory to use the light bulb together with whatever form of current it is designed to be used with.



Light bulb filaments can be a variety of shapes, but they all get hot, they are all supported by a wire structure, and they are all fragile.

Tape match books carefully and securely to the structure that holds the filament. Don't stress the filament; it breaks easily, even though it's springy, not brittle. Anchor the book to the base and anything solid that protrudes from it. Make sure match heads contact the filament (even though they don't have to). Build a secure sanctuary for the filament and its structure as you add more books.

Add more match books and tape until the filament, the wire that holds it, and the base are completely covered. Make sure that at least one row of match heads is exposed and the top is open; fire will blow out the end.

Use incandescent bulbs with household electricity, auto lights with auto batteries, flashlights with their batteries, and so on. If you do not do this, test your device or it will be unreliable.

It is easiest to use the bulb in its own socket. If this is not available, direct wire it as explained previously .

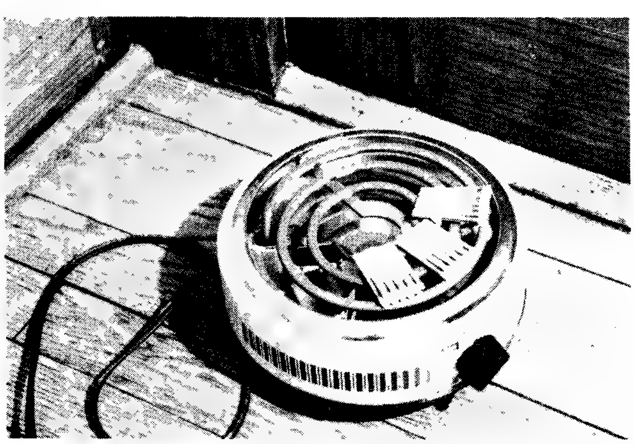
Once this is done, the filament is set in direct contact with tinder. Black or smokeless powder, potassium chlorate/sugar, various gasses, and similar fuels work well. Paper matches work well.

A liquid fuel-soaked rag will also work, as long as the air/vapor mix is right, and the liquid doesn't all evaporate and dissipate before the switch is activated. This can be accomplished by putting the fuel-soaked cloth in a plastic bag; make sure the bag has air in it, and will burn through.

A room full of a mix of air and flammable gas or vapor will also work, as long as there is the right concentration of fuel at the point of the fire. Matches or some other expander would still probably be a good idea.

HEATING APPLIANCES

Unlike lamps made for illumination, that give off heat as a by-product, many appliances generate heat as their designed product. These include soldering, clothing, and curling irons, space heaters, toasters, stoves, ovens, and charcoal starters, among other things. Any of these can be used to initiate a fire, with little or no alteration, if you have suitable tinder and you can get it close enough to the source of heat. Some require more sensitive tinder than others. Most can be easily wired to a timer, remote, or boobytrap switch.



A portable electric burner is a very good fire-starter; simply pile crumpled paper, cloth, or other fuel on it. Matches laid on the burner make ignition quicker and more positive. They should be taped down, so that they donít slide off when more fuel is piled on.

HOT WIRE IGNITERS

Using an electric current too big for its conductor, a fire-starter can be made with common materials. There are many ways for this to be done. Two will be given in detail.

What is required is a source of electricity, wire to carry it, and a thin wire to resist the flow and get hot. Getting the right balance between amount of current and size of wire is essential: if the wire is too heavy or too long it will not get hot; if it is too thin it might burn through so quickly that it won't light the tinder.

Since there is such a wide variety of materials available, and such a wide range of power in electrical sources, it is not feasible to give you a wire size and say this is the size to use. Some sizes will be given, but you should test any combination you intend to use to make sure it works. Some situations make this easy; some make it difficult or impossible. Just remember that the reliability of your device will be greatly reduced if it has not been tested, and testing is usually fast and easy, if you have a little extra material.

One of the best sources of thin wires that will heat up is stranded wire commonly found in lamp and other appliance cords. Depending on the amount of electricity, one or more strands will be used. Most electrical devices have thin stranded wires inside that can be taken out and twisted apart and used. So do most vehicles. Phone and other communication lines have a lot of little wires. Strips cut from beer cans and tin foil folded into a thin ribbon will work if they are thin enough; with flashlight and other relatively small batteries it is difficult to cut the strips thin enough. Twist ties, used to close plastic bags, are made of very thin steel wire encased in paper or plastic; these can be stripped and used. Paper clips can be used if there is enough current to heat them sufficiently.

In most cases, electrical igniters will be used with timer, remote, or boobytrap devices. This means that a switch will also be necessary. A few of these are given in this chapter; more will be covered in the next chapter.

The wire in this type of igniter will get red hot and probably burn out in around a second. After it burns, the current is cut and the wire cools off right away. So it is essential that very sensitive tinder be used, and that the tinder be in direct contact with the hot wire. The best common tinders are match heads, gunpowder, and other good fuel/oxidizer combinations.

FLASHLIGHT BATTERIES

These have a wide range of sizes; any that can make light can make heat as well, if they are connected to the right wire. These instructions will cover one of many devices that can be made with the most common size, D; they can be adapted for use with other sizes.

Batteries have a few advantages over household current: there are no circuit breakers and they are self-contained. They are also safer, as long as they're not too big (i.e., D or smaller).

If you have flashlight batteries you might also have the bulb that goes with them. The filament makes a good hot wire, though it is tiny and fragile. Follow the instructions given earlier about wiring direct and breaking a bulb.

Without the bulb and batteries the rest of the flashlight won't be much good for anything, so you might just use the whole thing, including the reflector to support tinder and the switch to activate the device. In this way with fuel added it can be used as a hand held igniter, for things like lighting fuses and initiating big fuel spills.

For the following igniter, you need two D batteries, a section of lamp cord six or so inches long, a flashlight bulb or a few single strands of wire at least four inches long, probably from the same cord, tape, preferably electrical, and a few books of matches. You only need one book, or even half a book, but more will allow you to test your device; if you are short on matches, you can test the device with a single match head at a time. Use the newest batteries you can find; if all you can get are batteries that have been used, be sure to test the device to be sure they have enough juice to heat the wire.

The two wires that run from the ends of the batteries should be no longer than they have to be; if they are too long their resistance will not let enough power get to the hot wire to heat it sufficiently.

Set the two batteries together end to end the way they go into a common flashlight, with the male end of one touching the female end of the other. Make sure they are in a straight line, with the contact points touching. Put a piece of tape an inch or so long across both batteries to hold them together; roll the batteries over and do the same on the opposite side. Making sure the two batteries stay in a straight line, wrap tape around them a few times where they come together. This should form them securely into a single unit.

Separate the section of lamp cord into its two halves, and strip the insulation from around a half inch or so of both ends of both wires. To make a switch, cut one of the two wires in half, and strip the two ends. Set one of the short wires aside for now.

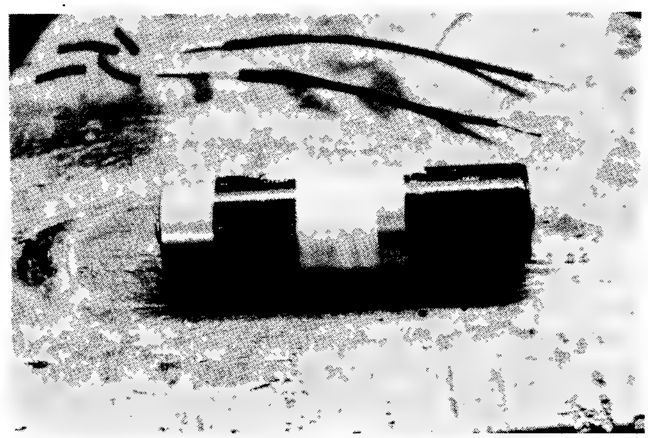
Set one bare end of one wire against the male end of the combined batteries, and tape it in place with a piece of tape a few inches long. Form the tape and wire down over the end with your fingers to be sure there is good contact. Tape one end of the other wire to the female end of the other battery in the same way. Then wrap tape lengthwise around both batteries and over both contact points, pulling the tape tight as you do.

Cut off a section of lamp cord four inches or longer (longer wire is easier to work with, so cut several inches if you have it to spare). Separate the section into its two halves. Strip all of the insulation away from one of the sections, being careful not to damage the fine wires inside. Pull a few strands of wire out of the bundle. One strand is all you need, but more will allow you to test the device; each strand can only be used once, or twice if it's long enough to be folded in half.

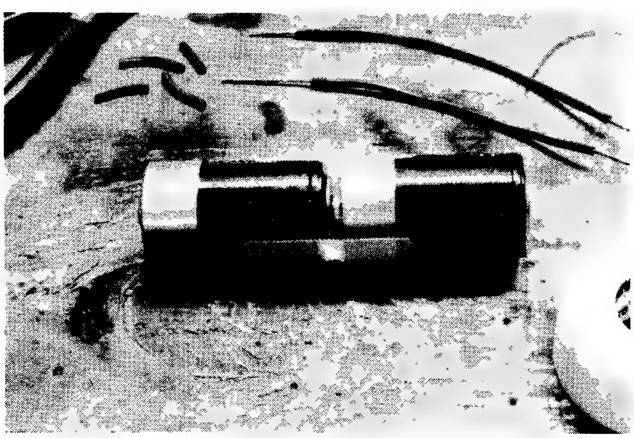
Separate the match book from its cover. Weave one strand of wire through the match heads, making sure it contacts the heads. To make it secure, wrap it around one or two heads at either end of the matchbook. There should be at least an inch of wire left over at both sides of the book.

When the bare ends of the wires leading off the batteries contact these ends, the thin wire will heat and the matches will burn, if everything was done right. Test the device by wrapping one thin wire end tightly around the end of one of the wires leading from the batteries. Be careful the other two leads don't accidentally make contact as you do this, or you might get burned. Wrap the wire as close to the match heads as you can get it.

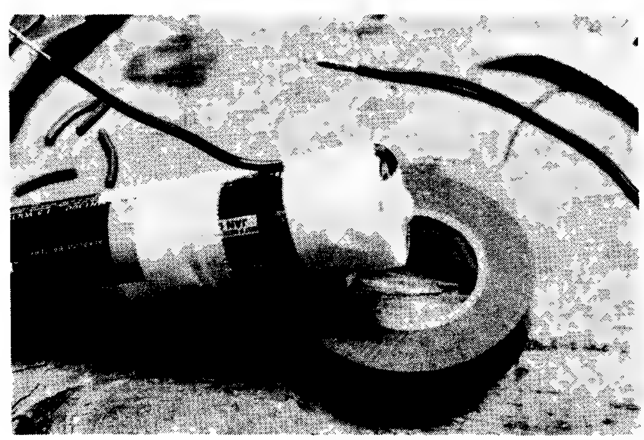
Work station set up to make a battery-powered igniter. A single strand of wire is used for the hot wire. Keep the wire leads as short as is practical; if they are too long the device will fail. Electrical tape works best, but other kinds can also be used; white medical tape is used in the following pictures for greater clarity.



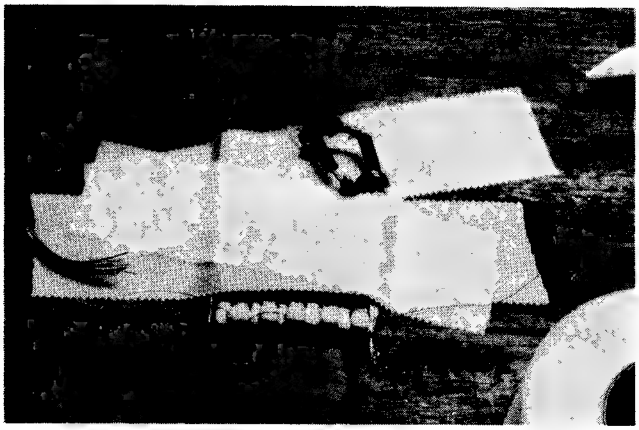
Tape is wrapped around the area where the two batteries come together, holding them securely in line.



The batteries are set together end to end, with the male end of one touching the female end of the other. They are set in a perfectly straight line, and held in that position with two strips of tape.



A bare wire is taped securely to the open contact point at the end of each battery. Tape is then wrapped around the battery and wire to hold the wire secure. Tape is then wrapped longitudinally around both batteries, holding them and the wires squeezed together in a straight line.



The hot wire is woven through match heads, then wrapped tight around the bare ends of the wires coming off the battery terminals. The hot wire should be no longer than necessary (the part on the outside of the two leads doesn't count). A simple switch has been installed. The igniter is ready at this point.

When the switch is activated, the hot wire heats up and ignites the matches.

There are many ways for the mechanism to be assembled; this laboratory specimen, complete with a switch, shows the basic structure.

At this point there are two bare wire ends left, one coming off the batteries, the other coming off the match book. Touch the two ends together close to the match heads, and hold the wires against each other until the matches burn. They should burn within a few seconds; if they don't burn after several seconds, your batteries are weak or you have done something wrong. Feel the wire to see if it even got warm.

If the matches do burn, the basic igniter is complete, and you know it works. Pull the thin wire remains off the bare ends of the battery wires and throw them away. Even if the wire didn't burn through, it is still no good; it will usually only heat up one time.

Once you have the basic device made, secure it into a package with tape, glue, wire, nails driven into wood at either side and bent over, or in some other way. Install a switch in either of the wires leading off the batteries, but leave the wires as short as possible.

The switch is installed in the wire that you cut in half earlier. The simplest switch is to twist one bare end of the free wire into a loop around the insulated part of the wire leading off the batteries, then twist the bare end of the battery wire into a loop around the insulated part of the free wire. As long as the wires stay in that position the line will be broken and there will be no current; when the wires are pulled apart the bare ends will come together, completing the circuit and causing the thin wire to heat up. For more on this see "Wire Loop Switch" in Chapter 6.

Some sort of weight, spring, or rubber band should be used to pull the wire ends together, because they need to make good contact for a few seconds in order for the device to work. The batteries themselves can be the weight, or something else can be used. Don't use so much weight that it pulls the wire away from the terminals.

With the switch installed and in the off position, wrap either end of the thin wire woven through the match heads around the ends of the wires leading off the batteries, as close as possible to the match heads. Secure fuel or a fuse over the match book to carry the fire to the next medium.

HOUSE CURRENT

The electricity available by way of outlets that are common throughout most buildings can be used as a source of ignition. House current is usually quite a bit stronger than battery current, it is protected by fuses or circuit breakers, and it can be cut off, while battery current will usually be contained within the device you build, and so can not be cut off from the outside.

An igniter using house current can be made by deliberately making a short circuit. There are many ways it can be done; one will be given in detail. It is very easy to make.

For this igniter you need an electrical cord that can be plugged in, and a switch. You also need a knife or other cutting and stripping tool, and tape, preferably electrical. Side-cutting pliers are useful but not essential.

Make sure the cord is not plugged in, and then separate the two halves of the cord by pulling them apart a few inches. If there is a third wire it is the ground; it can be identified because it doesn't have its own insulation; simply cut or move it out of the way. Strip an inch or so of insulation from the end of both wires.

At this point a switch should be installed. This can be anything from two bare wires looped around each other, to a thirty-nine cent switch and fifty-nine cent work box you buy at a hardware store, to something more sophisticated. Anything that has moving parts that can be wired to can become a switch. It does not necessarily have to be inserted at this point, but if it is not one of the wires at least needs to be cut before you connect the cord to your power source.

If the switch you are using is one you plug into, such as a twenty-four hour timer or wall switch-controlled outlet, you don't need to worry about any other switch; simply leave your power cord unplugged until you are finished, and make sure the power to the outlet is off when you plug it in.

You make the short circuit by simply twisting the bare ends of wire together. When the power is turned on, there will be a spark at or near the point they come together, and the spark will ignite sensitive tinder such as match heads. There is a good chance that the short circuit will kick off a circuit-breaker or blow a fuse before it makes a spark. To keep this from happening, use half or less of the wire strands; bend the other half well out of the way and make sure they don't make contact with each other. Or cut them off.

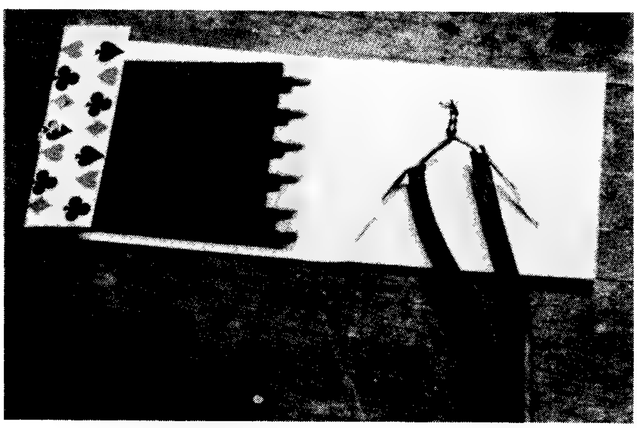
Tape the insulated part of the wire securely to the sticks and base of a paper matchbook, with

the twisted bare wire in contact with the match heads. Make sure no bare wires touch each other except where they twist together. Tape another book securely to the first book, with the twisted wire sandwiched between the two rows.

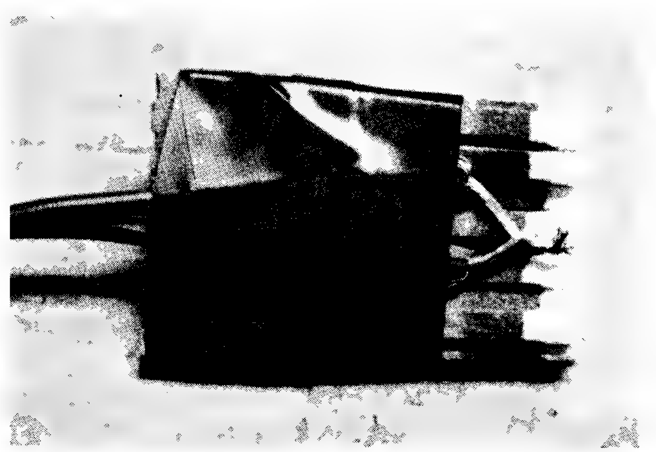
At this point the device is ready; when it is plugged in it is armed. When the switch is activated, the twisted wires will burn, and ignite the match heads.

Test the device before you use it; matches are cheap. You don't have to tape it to test it; just stick the twisted wire between the two rows of a book of matches. Watch it closely as you do this. If the device fails, figure out why and try again; if you tripped a breaker, you are using too many wire strands. If the wire burns through but doesn't light the matches, you are using too few. Half or a little less of the strands should be the right amount.

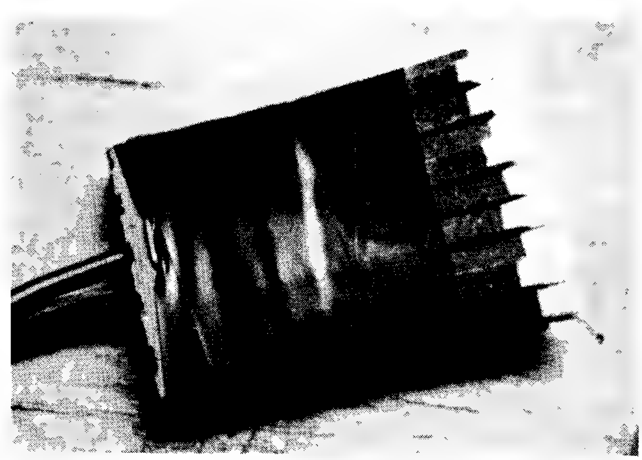
When the device works, disconnect the power, cut the burned ends off the cord, separate and strip the ends, and remake the device exactly the same as the one that worked, with a new book of matches (or pile of powder, etc.). Tape the cord securely enough to the match books that it can not be pulled away, but do not tape over the match heads.



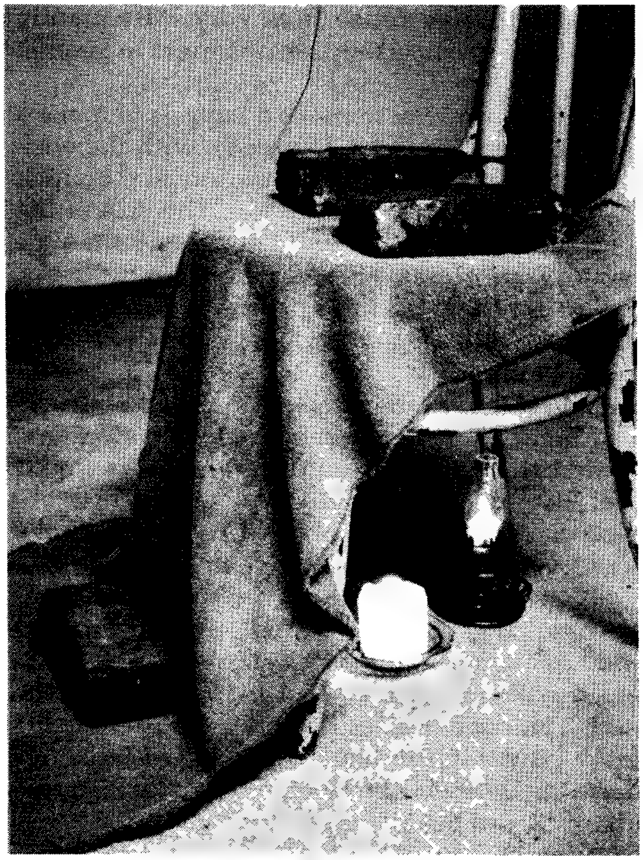
Twist approximately half the strands of the bare ends of lamp cord together; fold the rest out of the way. Test the device to be sure you have the right amount of wire; this one has been tested, the wires cut, and the ends re-stripped.



Tape the wires securely to a book of matches with the cover removed; make sure all of the twisted wire contacts the match heads. Tape the wire well enough that it can't easily be pulled loose.



Tape another book of matches securely over the first book so that the wire is completely covered. Keep the match heads free of tape. Add as many more matches as you want, for a bigger ignition.



A burning candle and liquid fuel lamp wait for a spill of volatile liquid fuel. A large amount of fuel dumped on them might put them out instead of taking their fire, so they are protected by a tent made from a chair, towel, and three weights. When the spill occurs, fumes will reach the flames.

CONCENTRATED SUNLIGHT

There have been cases of accidental fires being started by sunlight passing through curved glass and so being concentrated. Sometimes it is a result of kids playing with a magnifying glass. Other times glass with the right curve or glass with bubbles in it (rarely found any more) is just accidentally the right shape. Magnifying mirrors also start fires.

Typically in such cases the sun has heated the interior enough that the small part of sunlight that is concentrated has preheated air and fuel waiting for it. Very good tinder is necessary, and the concentrated sunlight has to stay in contact with it long enough to get it burning.

This is a way to start a fire if you don't have anything better to use. A magnifying glass works best. Magnifying mirrors also work. Lenses of telescopes and binoculars will work. Eyeglasses will work. Any thick, curved glass might work. According to Bradford Angier in *Skills for Taming the Wilds*, "A satisfactory lens can also be fashioned by experimentally shaving, and then smoothing with the warm hand, a piece of clear ice."

This device can be used as a timer, or to make a fire appear accidental. See Chapter 6 for more on this.

PRE-EXISTING FIRES

In some cases preexisting fires can be used as a source of ignition. In these cases release of fuel is the thing that triggers the fire. Since it is fumes that burn, these igniters can not be used safely with fuel that is not completely contained. As with other igniters, more than one should be used to increase reliability.

The most common example of this is the use of pilot lights to ignite gas; escaping gas builds up (or down) and mixes with air until it reaches both its flammable limit and a pilot light, at which point it burns, usually so quickly as to cause an explosion. Any gas appliance will have a pilot light. This includes gas water heaters, clothes dryers, central heating systems and space heaters, stoves and ovens (some people forget about the one in the oven), and air conditioners.

Candles, liquid fuel lamps, and torches can be set so that when fuel is released, by a timer or boobytrap device, they will ignite the fuel. They must be set so that the fuel will not be dumped on them and put them out. If the fuel is liquid, make sure it is fumes and not the liquid itself that contacts the flame. This is accomplished by proper placement of the igniter, and/or by setting a shield between it and the fuel.

A shield, such as a lean-to made out of cotton or a table laid on its side, will stop the wave of spilled liquid, as long as the shield is anchored and supported well enough, and it will let fumes through, which will be ignited by the flame. Make sure the tent doesn't deprive the igniter of the air it needs.

CANDLES

These used to be as common as light bulbs, and they are still fairly common, though they are no longer in general use for illumination. They

are good firestarters, and have started many accidental fires. They can burn for a long time.

A candle is similar to a liquid fuel lamp, except that the fuel starts out solid and is liquefied by the heat. Once the heat melts the wax, the wax is sucked into the flame by the wick. As the wax melts and burns, even the upper part of the wick is consumed, and the candle slowly and steadily grows shorter.

Some candles are not really made to burn; they are made to look at. Real wide candles will sometimes go out long before their fuel is consumed, and sometimes they will burn down into the candle without melting the sides. So stick to candles with more or less traditional candle shapes for a reliable igniter. Candles with a diameter of three or four inches can burn for days.

Some candles will go out even if they aren't big and fat, and some will melt down into a pool of wax instead of burning down like they're supposed to. So test one of the same kind of any candle before you depend on it.

Lay the candle over a ledge and hold the end down with a weight; pile fuel over the candle next to the weight, or wherever you want to put it for timer purposes. Or the fuel and weight can be one and the same thing, such as an artificial fireplace log. There are other ways to use a candle as a timer; see Chapter 6.

Candles start accidental fires in a few ways. Sometimes tall skinny ones fall over onto curtains, upholstery, paper, or other fuel. Sometimes candles that stand on their own are set on something that will soak up wax and become a wick when the candle burns down to it. Sometimes they are set too close to fuel.

In direct fire-setting, a candle can be used together with an igniter such as matches or a cigarette lighter, to extend the time of the flame and conserve the igniter.

LIQUID FUEL LAMPS

Like candles, this type of illumination was commonly used throughout the world from early civilization to the last century. They range from clay bowls filled with oil or fat with strips of cloth laying over the lip, to ornate glass bowls of kerosene, with adjustable wicks and glass chimneys. The mechanism is very easy to improvise.

Liquid fuel lamps have been the ignition system of many fires, both intentional and accidental. They cause fires very infrequently these days, because they are no longer in general use.

The easiest way to make a lamp is to make a molotov cocktail (see Chapter 5), with the wick extending all the way to the bottom and an inch or so extending up out the top. The size of the wick, both in diameter and length, and the type and amount of fuel determine how big the fire is, and so how long the fuel will last. With a big supply of fuel and a small flame, a lamp can burn for many hours.

Unless the wick is very small, a lamp will have a stronger flame than a candle. But a lamp flame should still be protected from a wave of liquid fuel that might put it out.

A lamp made like this will probably smoke pretty badly, which might give it away.

A molotov cocktail can be hung with non-burning rigging like wire, or propped up, and used as a timer or boobytrap igniter. On triggering it falls and breaks, and the wick lights the fuel. The sooner after activation it is used the more power it will have, but with suitable tinder, a small amount of fuel, or even just a burning wick, can be enough.

TORCHES

A torch is a source of flame that has a handle. It can be a cutting torch, a common propane torch, or an improvised torch. Any of these things can be left burning, so that when fuel is released and it reaches them, it will ignite.

An acetylene cutting torch produces a very hot flame if it is set right. As long as it has a supply of fuel and oxygen it will continue burning (it will burn with fuel alone, but not as intensely, and the incomplete combustion might cause the holes in the tip to fill with soot, putting out the flame. How long a torch can remain burning depends on the size of bottles (or tank), how full they are, and how the torch is set. Even though the flame is very hot, it can be extinguished, so be careful how you apply fuel to it.

A propane torch is not as hot but is hotter than a candle and has a strong flame. These are commonly used for plumbing and other things.

Torches are as old as or older than liquid fuel lamps and candles. A long skinny piece of wood secured at a slightly upward angle will burn for a while. A stick with absorbent cloth wrapped

around the end and the cloth saturated with liquid fuel such as animal fat or motor oil will burn longer and have a much stronger flame. Don't saturate it so much that it drips fuel.

In movies people are always taking sticks out of campfires and swinging them around as weapons. Don't try this yourself: it is as phony as network television news. A stick burning in a fire will not burn with a flame very long after it has been pulled out, unless it is held right; swinging it around will put it out pretty fast. Glowing combustion will continue for some time, and that can be enough to get a fire started, if fuel is applied very carefully to it. But it isn't a torch.

A small torch can be improvised easily from a cigarette lighter. A Zippo type can simply be lit and left standing. A butane lighter has a button next to the striking wheel that has to be held down in order for fuel to be released; this can be accomplished easily with a piece of tape. Once the button is taped down fuel will escape, so it is the last thing done before the lighter is lit.

A liquid fuel lighter doesn't have a very big fuel supply, and so won't burn very long. A butane lighter will burn longer. The flame of the butane lighter is similar in strength to a candle flame. It's plenty big enough to get a big fire going, you just have to be very gentle with it and apply fuel carefully.

PILOT LIGHTS

These are by far the most common preexisting sources of ignition. Know their location so that you know where to spill fuel. They are in all gas appliances, including stoves and ovens, water and building heaters, clothes dryers, and air conditioners, among other things. Make sure the appliance is gas and not electric. If you want to make a fire look accidental, a pilot light can be a very useful igniter.

Pilot lights commonly ignite the fumes of accidentally spilled or improperly stored volatile liquid fuel, and are a common source of ignition in gas fires. Fumes are usually heavier than air and gasses are usually lighter, though propane and butane are heavier, and will lie on the floor and build up like liquid vapor.

To know where to cause release of fuel, you need to know whether the gas or fumes are heavier or lighter than air (see Chapter 2). Pilot lights are usually close to the floor, but sometimes they are elevated for safety. Fumes that fall to the floor and build up will hit a low pilot light in as little as a few seconds, though they will probably take longer, depending on volatility and other factors. The right concentration of fumes might not reach an elevated pilot light, but if it does there will be a bigger explosion.

Gasses that rise and build down might not ever reach a flammable concentration at the level of the pilot light, if they are able to diffuse out of the building. But if they do, the explosion should be big. This depends on the size and tightness of the building, and on the type of gas.


FLAMMABLE

Chapter Five

Delivery Systems

There are a number of ways fire can be delivered to a target. They fall into two broad categories: direct and indirect. Direct means you pour fuel onto the target and set fire to it. Fire might be initiated directly by you lighting a match, or by a timer, boobytrap, or remote, but the application of fuel, and therefore fire, is still direct. Indirect methods allow you to apply fire from a distance. They usually involve the use of a Molotov cocktail, or something similar. They will be covered first.

THE MOLOTOV COCKTAIL

Molotov cocktail is the common name for an improvised incendiary grenade made with liquid fuel, a wick, and a glass bottle. The device goes way back, but the name comes from Vyacheslav Mikhaylovich Molotov, who served as deputy chairman of the State Committee of Defense of the Soviet Union during the Second World War, where the fire-grenade that bears his name was used by Soviet soldiers against the invading Nazis. The name Molotov, a pseudonym, literally means hammer in Russian; this means its true name is the hammer cocktail, which seems appropriate.

A fire grenade can be very effective in combination with other arms, and is not much bigger than a handgun. Unlike the pistol, the grenade is a single-shot device, but the one shot is a big one.

A Molotov cocktail consists of a bottle or other breakable container filled with liquid fuel, often liquid fuel that has been thickened to some degree. A piece of cloth is set in the bottle, extending well down into the fuel, and sticking up out of the top. This cloth acts as a wick, though its purpose is more to hold fuel than to suck it. Just prior to use the wick is saturated with fuel (if it hasn't been already), and set on fire. The bottle is then thrown. When the bottle hits it breaks, spilling its contents, which are ignited by the burning wick.

A Molotov cocktail is very similar to a liquid fuel lamp, and in fact can be used as one: both consist of a store of liquid fuel in a fireproof container, with a wick to suck out a small amount of fuel into the air and hold it there, where it can be set on fire, and will continue to suck fuel and burn due to wicking action. As long as the wick of a lamp remains in contact with the fuel contained in the lamp, it will continue to suck the fuel out, and the fuel will continue to burn; the wick itself does not burn.

Back when liquid fuel lamps were common, factory-made Molotov cocktails were sometimes

used as improvised incendiary grenades. Sometimes they even started fires accidentally. A notorious cow owned by a Mrs. O'Leary is reputed to have started a really big fire in Chicago some time back, simply by kicking over a lamp. If something so simple could start such a big fire though, there had to be more things involved than the simple act of ignition.

FUEL

The best fuel for the Molotov cocktail is liquid fuel that has been thickened, known generically as napalm. This can be anything from gasoline and oil to polypropylene. Even unthickened fuels, such as a bottle of 180 proof alcohol with a rag stuffed down its throat, will have a big effect; it will just be less than that of thickened fuel.

Fuel is thickened to slow down burning and to make the fuel stick to the target; the latter is very important with moving targets such as vehicles. Inside a building it doesn't usually matter whether fuel sticks to the walls or runs down onto the floor, but slowing down burning rate increases the chance of starting secondary fires.

The best napalm mix is the most common and easiest to make: gasoline and motor oil. They are both very good fuels (see Chapter 2). Gasoline takes fire easily and spreads it quickly; oil sticks to things and burns for a long time. The two come from nature mixed together, and reunite very

A liquid-fuel lamp with a breakable reservoir is a molotov cocktail. Before you throw it, remove the glass chimney and raise the wick up around five inches.

well, with no effort on your part. A wide range of mix ratios will work very well; ratios can be adjusted for things like weather. The oil isn't so thick that it doesn't spread well when the bottle breaks, and it's as sticky as any napalm.

Work station set up for the construction of a liquid fuel fire grenade. A Molotov cocktail can be made of many things; those shown here are among the best. A mix of gasoline and motor oil is about as good as any napalm you can make. The washcloth cleans up any little spills, then becomes the wick.

Mixes that turn liquid fuel into a gel or paste can make it hard to get a wick in and out. The wick can be inserted while the mix is still liquid, but if the napalm sets up too hard it will be difficult to pull it out. If you put the lid on while the mix is still hot, the negative pressure from the shrinking mass can give you a good seal; it might also make it hard to get the wick out.

An advantage of a gel or paste is that it is a little safer to carry, because if the vessel carrying it breaks it won't spill all over the place. This is also in regard to breaking when it is thrown. After the bottle breaks the burning mass will quickly melt and spread, but the force of the throw will not spread it as far, depending on how thick it is. Usually you want to cover the biggest area you can, but not necessarily; there will be the same amount of fire either way.

Sometimes solid fuel, such as very dry sawdust or charcoal, is mixed in with napalm. This

addition does not make the fuel necessarily any better or worse, it just changes it. The effect is to concentrate the fire into a smaller area, and prolong burn time. The addition of such fuel is much easier with jars than with bottles.

A Molotov cocktail is probably at its best as a purely liquid-fuel grenade. But if you don't have enough liquid fuel to fill your jar, you might as well fill it the rest of the way with whatever solid fuel you can find. Just make sure there is at least enough liquid in the mix to saturate and feed the wick, and get all the solid fuel burning.

Bottles and jars with small mouths are much easier to fill with a funnel. These are easy to find, but if necessary one can be improvised, by rolling up or making a trough out of a piece of thin cardboard, or aluminum cut from a beer can or something similar. Make one end small enough to fit into the mouth of the bottle, and leave the other end big enough to pour into. The less absorbent the cardboard is, the better it will work.

Even with a funnel, pour carefully, so that you and the bottle don't smell like fuel. Wash your hands and the bottle thoroughly after you're through filling and capping it. Keep in mind as you do that warming the container (i.e., by immersing it in warm water) will increase the vapor pressure inside.

CONTAINERS

To be useful as a container for a Molotov cocktail, a vessel needs to be able to contain the liquid fuel, support a wick, be thrown without losing the wick or spilling the liquid, and break, which usually means being made out of glass. If the glass is too thick, it will break, but not easily; if it is thrown so that it does not strike fairly straight into a hard surface, it might not break, rendering the grenade virtually worthless, except perhaps to your adversary, who might pick it up and throw it back.

Molotov cocktails have been made from all kinds of bottles; many have been made from wine and soft drink bottles, which meet all the requirements very well, though some of them are thick and relatively hard to break. These bottles are designed to be held in a hand, and have a small mouth that supports a wick easily. They are big enough to carry enough fuel to get a good fire going, but are not so big that they can not be thrown well or far.

These days most soft drinks come in plastic bottles, which are of no use for Molotov cocktails (though they do have other uses). Beer and many other alcoholic beverages come in thin glass containers that break easily. Kitchen cupboards and refrigerators often contain many good glass bottles and jars that can be emptied, washed out (if necessary), and filled with napalm.

Bigger bottles, such as the gallon jugs apple cider and cheap wine come in, can also be used for Molotov cocktails. These are obviously much more powerful than their smaller counterparts, and also harder to throw. But they can be heaved pretty far by a strong arm and back, dropped from above, or thrown by a mechanical device.

Many bottles have big labels on them. These can be removed, if desired, by soaking the bottle in hot water; usually a lot of it can be ripped or cut off without water. A label will not keep a Molotov cocktail from breaking on impact, but will slightly inhibit the flow of fuel that results immediately afterward; this might be good or bad, depending on how the grenade is used.

Usually you want to cover the biggest area you can, but if there is a specific thing or place you want to get burning, fuel concentrated on it

Labels will not keep bottles and jars from breaking. They will tend to reduce the area covered by the initial spill a little bit; this isn't necessarily good or bad, just different.

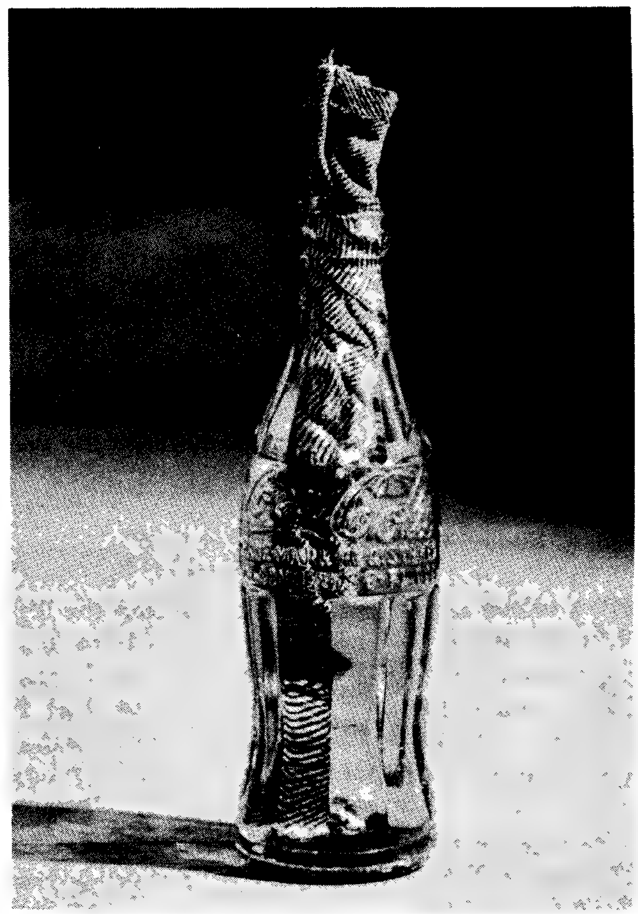
The power of a Molotov cocktail is directly proportional to its size. Even a small one can start a fire that will grow into a big one, but a big grenade will start a much bigger fire, that will cover more area, and develop faster and more certainly. The ability to be carried easily is also proportional to size.

can be better than fuel spread over a bigger area (though not necessarily). Tape, paper, or cloth wrapped around the bottle will concentrate fuel even more than a label, if that is what you want. Like the label, this will all become more fuel.

A bottle with a lid that can be removed and replaced easily is beneficial because it simplifies carrying the grenade. Lids on most bottles these days are twist off, which work very well in this regard. Even the old-fashioned crimped lids can be put on and popped off easily if you have an opener.

A glass jar with a lid can also be used for a Molotov cocktail. A lid is required, because the wide mouth of the jar will neither support a wick nor keep the fuel from spilling when the grenade is thrown. A hole cut in the lid with a knife, just prior to use, will perform more or less the same as the small mouth of a bottle. A jar with a hole cut in the lid is a little more difficult to wick than a small-mouthed bottle, until you get a feel for what you're doing, after which it's easier, because you just poke a hole and pull the wick through instead of having to stuff it through.

A jar has an advantage over a bottle in that its shape is very efficient in regard to the amount of contents it holds; the neck and mouth of a bottle don't hold much fuel. Compare a quart jar to a quart bottle and this will make sense to you. And the jar is a lot easier to fill.



Molotov cocktail reminiscent of the 60s, made with a pop bottle and faded jeans. This one is loaded with solvent, which is far less common than a mix of gasoline and oil. The wick is longer than it needs to be, but there's no reason to cut it off.

A fancy bottle with a limp wick will start a fire, but a stiff wick is much better, because it keeps the fire away from the hand. This wick is limp because it is soft and there isn't enough of it; the wide mouth doesn't hold it very well either.

This washcloth-wick appears to take up quite a bit of space, displacing much fuel. But since so much of it is air, it really takes up very little space, and it doesn't displace any fuel, because it is fuel. A quart jar makes a powerful, compact fire grenade.

VAPOR PRESSURE

Above the temperature at which it will evaporate, liquid fuel is always giving off fumes. These fumes take up more space than they took up as liquid. So volatile liquid fuel in a closed container will build up pressure. If the container is not completely sealed, fumes will seep out. If it is sealed, they will remain inside, building up more pressure. If the vessel is not strong enough to contain this pressure, it will break.

What this means is that a Molotov cocktail with a sealed lid might build up enough pressure to break, maybe even within a few minutes. If you are carrying it in a bag or pocket when this happens, you or your bag will be soaked with liquid fuel. There are a few ways this can be avoided.

Most lids don't make a perfect seal, so as long as you don't improve the seal, such as by wrapping plumbers' tape around the threads several times, the pressure will probably take care of itself. This means a small amount of fuel will seep out, and it will smell like fuel.

The less volatile a fuel is, the less vapor pressure it will produce. Less volatile fuels, such as kerosene, are better anyway. Mixing in nonvolatile fuels such as motor oil will reduce vapor pressure because there is that much less fuel evaporating. You want at least some volatile fuel mixed in to get it all burning well, but if you want to carry a Molotov cocktail in a sealed container, keep that amount small (i.e., 25%).

Since air can compress, leaving a vessel less than completely full will reduce the chance of it breaking.

Some bottles and jars are designed to hold pressure. Anything that gives off gas, such as beer and champagne, is sold in such a container. Things like whiskey, that do not develop significant pressure, are sold in bottles not designed to hold pressure. Bottles designed to hold pressure are usually cylindrical, with gently sloping shoulders. Jars are not usually designed to hold pressure, though their shape is good in that regard.

The warmer the fuel in the jar is, the more it will evaporate, and so the faster it will develop pressure. So one carried in a cold environment is safer than one carried in a warm environment. If you carry one in a pocket inside a coat, your body heat will warm it.

Since there are so many variables, it is not possible to say for certain whether a particular sealed vessel will hold the pressure inside it or break. So before you carry a sealed Molotov cocktail, test one exactly like the one you intend to carry, at the temperature you will be carrying it in, for the amount of time it will be carried sealed. Shake the bottle around to make it generate more pressure. Do this experiment in a place where a bottle filled with volatile fuel breaking will not cause a problem. Wear leather gloves and good eye protection.

WICKS

The purpose of the wick is to hold fuel and burn as the bottle is thrown, igniting the fuel when the bottle breaks; the wick also plugs the opening in the bottle it runs through, so that fuel doesn't spill when the grenade is carried and thrown. The grenade is armed when the wick is set on fire.

There are differences between the wick of a lamp and the wick of a Molotov cocktail. The former is designed to wick fuel slowly and produce a flame of measured size. The size of the flame is controlled by the amount of wick above the mouth of the fuel reservoir. The wick then holds the fuel suspended above the reservoir as it burns, giving off light. The fire draws fuel up the wick. This process sustains itself, as long as the fire burns and the wick is in contact with fuel.

A Molotov cocktail wick does little actual wicking. Its purpose is to hold fuel as the grenade is thrown and flies through the air. It needs to hold enough fuel that the flame it feeds is big enough that it does not blow out, and it needs to provide a continuous supply of fuel. It also needs to be big enough to plug the hole it fits through. There is some wicking action after the wick is lit and before the bottle breaks, but the main purpose of the wick is simply to hold fuel. Unless the wick is lit and held for awhile before it is thrown, there isn't time for much wicking to occur.

Any absorbent cloth cut to the right size will work for a wick. It is best to avoid fabrics containing fire-retardant chemicals but they will work. They don't have to burn. All they do is hold fuel. The best types are natural fabrics like cotton. Man-made materials, like nylon and polyester, don't hold fuel very well; polypropylene is an exception. Cotton blends should work fine.

Absorbent paper, such as paper towels, will

work as a wick, but only if the grenade will be used very soon after the wick is inserted; otherwise, the fuel will likely dissolve the paper, making it useless as a wick. How long this will take depends on the type of fuel. Some fuels might even eat cloth after awhile.

Cotton, cotton blends, and other absorbent materials are very common. Many underclothes and socks are made from cotton. Much clothing, including most T-shirts, sweatshirts, and bandannas, are made from cotton or cotton blends. Bed sheets and pillow cases are usually cotton or cotton blend. Denim is cotton. Towels and washcloths are always made of cotton or other absorbent material.

The wick is formed by finding, folding, or cutting a piece of cloth to the right length and width; this might take some trial and error. A good size to start with is 10" X 10" if it is fairly heavy, as in a washcloth, or 10" X 18", as in a bandanna folded one time most of the way in half. This piece of cloth is folded over and over and rolled in the longer dimension, into a ten inch cord that looks too big to fit into the bottle.

A size ten medium weight cotton sock works well as a wick with typical bottles; if it is too long it can easily be cut off with a knife. The lower part of the sock is generally the most absorbent, so the top should be cut if any of the sock is cut off. Otherwise, feed the less absorbent part into the bottle first.

The size of the wick depends on the size of mouth and neck or hole it will fit through and plug, and also on the thickness of the material it is made from. A typical bandanna, folded in half to make a rectangle, is a good size for many bottles; heavier material needs to be less wide. Whatever is used, it needs to make a thick enough strand that when it is rolled up and stuffed into the bottle it is tight enough to plug the hole, and not fall out when the bottle is thrown. It should be difficult to push the wick down through the mouth of the bottle or through the hole.

A wick that is not as tight as it should be will probably work, but will let fuel drip out if the bottle becomes horizontal or upside down, as in being held just prior to being thrown, or in flying through the air. This dripping, burning fuel is a nuisance and danger to the user.

If a wick is very loose and also too short, it might fall out during flight, rendering the grenade useless, unless another grenade that is burning can be thrown on top of it. Even then, some or much of the fuel would have spilled during flight with no wick. With enough spilled fuel, a disengaged wick might still ignite the grenade, but there might not be much fuel left to ignite.

The length of the wick should be enough to let it extend several inches down into the fuel, and up four to six inches out the top of the bottle at the same time. When stuffed all the way in it should touch the bottom of the bottle. So the best length for most bottles and jars is a little more than the height of the vessel; some might work better with a longer or shorter one.

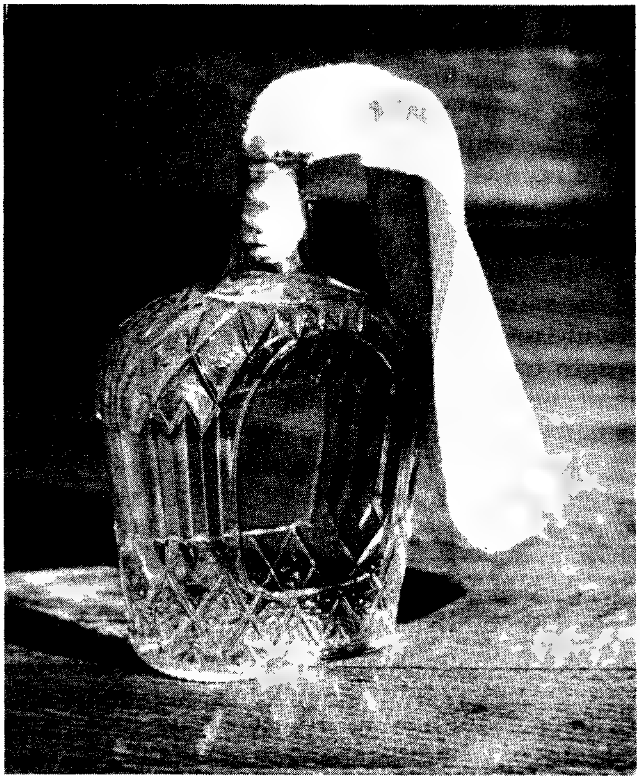
The wick will displace some fuel as it is inserted into the bottle, but not as much as it might appear. Since much of the wick's size is air, it will soak up more fuel than it displaces; even the part that does displace fuel simply exchanges one type of fuel for another. A wick that absorbs fuel does not waste the fuel, since the fuel it absorbs will still burn. A wick that is too big or not very absorbent though will unnecessarily lower the amount of liquid fuel in the grenade.

The wick still inside the bottle will hold fuel after the bottle breaks, slightly reducing the area covered by the grenade, but also extending burn time a little at the point where the wick lies. This might be good or bad, depending on the purpose to which the grenade is being put. The effect will be small in any case, unless the wick is very large relative to the fuel reservoir.

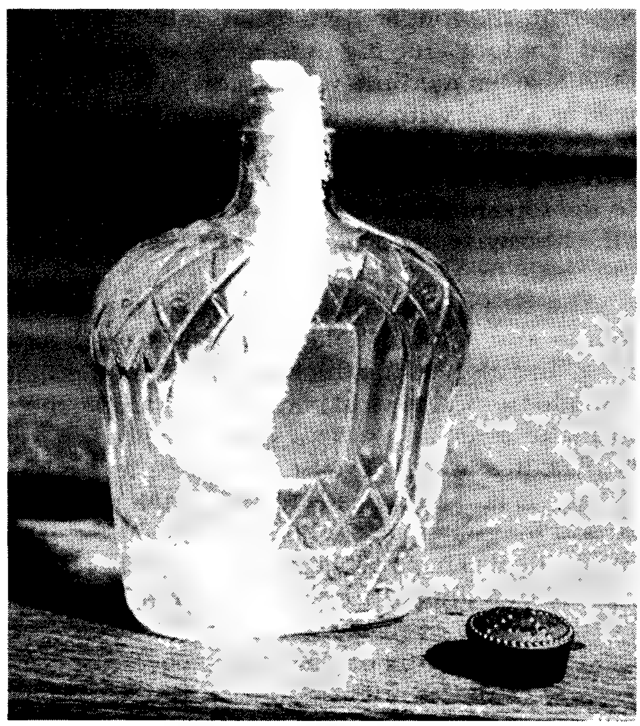
WICK INSERTION

The bottle should be filled to within around an inch of the top. As the wick is inserted it will absorb the fuel and also displace some of it, though not much of it, since so much of the wick's size is air. By the time all of the wick is inserted some of the fuel will have been forced out. This should be wiped up with the still dry part of the wick or something else. There should be little or no empty space left in the bottle after the wick is inserted.

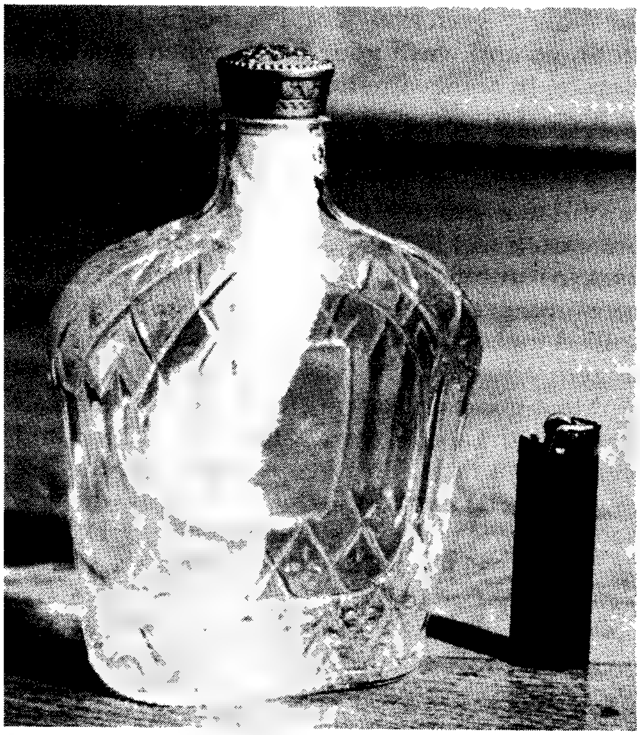
The wick is inserted by being pushed down through the mouth of the bottle. A good tight-fitting wick will need to be twisted as it is being pushed in. If it goes in too easy it isn't big enough. A wick made of very soft material might be inserted a little easier by using a pen or similar ram to help push it in.



Insert the wick by rolling and folding it into a rope and stuffing it through the mouth of the bottle. It should feel like it's almost too big to fit. Here a washcloth is used as a wick; it's made of absorbent material, and it's pre-cut to the right size. The bottle is filled with clear liquid so that the wick can be seen easily.



The wick is pushed in until there is only a quarter-inch or so left above the mouth. In this way the wick gets saturated with fuel and it's out of the way. Make sure you don't push it in too deep or you'll never get it out. A tight-fitting wick that is longer than the bottle is tall won't fall in on its own.



A lid makes carrying much easier. If the lid makes an airtight seal and the fuel is volatile, there are things you need to do to keep vapor pressure from breaking the bottle (these are explained in the text). The cushion of air shown in the picture is one.

Just before use, the lid is removed and the wick is pulled out roughly five inches. Note that even though the wick is made of soft cloth, it still stands up straight; this is because of the tight fit. A vertical wick keeps fire away from your hand when you throw the grenade.

If the grenade is going to be used right away, the wick is pushed in until it is tight and deep enough to hold and several inches are left extending out the top. If the material is very soft and will not stand up, as with a cotton sock, the wick is wrapped around the neck of the bottle and tied in a half hitch; this is to keep it from flopping down and burning your hand when you hold the bottle to throw it. Just before being thrown, the wick left extended above the bottle is saturated with the same fuel the bottle is filled with.

Unless the wick is very loose (too loose to be a good wick) and the bottle held upside down, the wick will not get saturated with enough fuel from the bottle to burn sufficiently. It needs to be either pushed down into the fuel and pulled out, or soaked from an external source of fuel.

Usually a Molotov cocktail is made in one place and carried to another place before being used. For this the wick should be pushed all or most of the way into the bottle. All of the way in means that the top of it is from a little above to even with the top of the bottle. If it is pushed in beyond this point it will need to be fished out, which might be difficult and time-consuming. If it gets in past the bottom of the neck you'll never get it out. If left even with or slightly above or even a little below the mouth, it can be gripped fairly easily with the thumb and index finger and pulled out when necessary.

Even if the bottle is shaken around a lot during transport, a tight-fitting wick that extends to the bottom of the bottle will not fall down into the bottle. If it isn't pushed too far down in the first place, getting a grip on the top of it to pull it up will not be difficult. If a cap is available, the wick won't get in its way.

The grenade is carried with the wick pushed in most or all of the way and a cap or other lid if you have one. Just before being lit the wick is pulled out four to six inches. Having been soaking in the fuel reservoir, the exposed wick is saturated with enough fuel to burn very well, as it is lit and the grenade flies to its target. Make sure it's burning well before you throw it.

Unless the top of the wick is above the top of the bottle and dry, pulling it out will get a little fuel on your fingers. As long as you are careful there won't be much and it can be easily wiped off; if you don't want to smell like fuel (which might give you away as the guy who threw the incendiary grenade), don't wipe fuel on your clothing, and wash your hands when you get a chance. In some situations plastic gloves might be a good idea.

A good wick that was hard to push in will have to be pulled fairly hard to be pulled out. Be careful that you don't slip and pull it all the way out; you'll feel like an idiot if you do. Forcing it back in saturated with fuel will be difficult, time-consuming, and messy. It will leave quite a bit of spilled fuel on the outside of the bottle and your fingers, which needs to be wiped off.

Most good wicks are stout enough to stand up above the bottle, though they might bend and lean back a little. This keeps them and the fire they hold off your hand when you throw the grenade. If a wick doesn't stand up and flops down on your hand as you grip the grenade to throw, you can tie it in a half hitch around the top of the bottle; this will be messy, and you will get fuel on your hands and the bottle, which should be wiped off. Or you can be real careful as you throw it. Or wear a heavy leather glove.

WICKING GLASS JARS

Glass jars are very efficient storage containers for liquids and semiliquids; they are cheap, common, and disposable in industrialized societies. For these reasons they are good incendiary grenades. The problem with them is that their wide mouth does not support a wick, and one big enough to plug the mouth would have to be the size of the whole jar, which obviously wouldn't work.

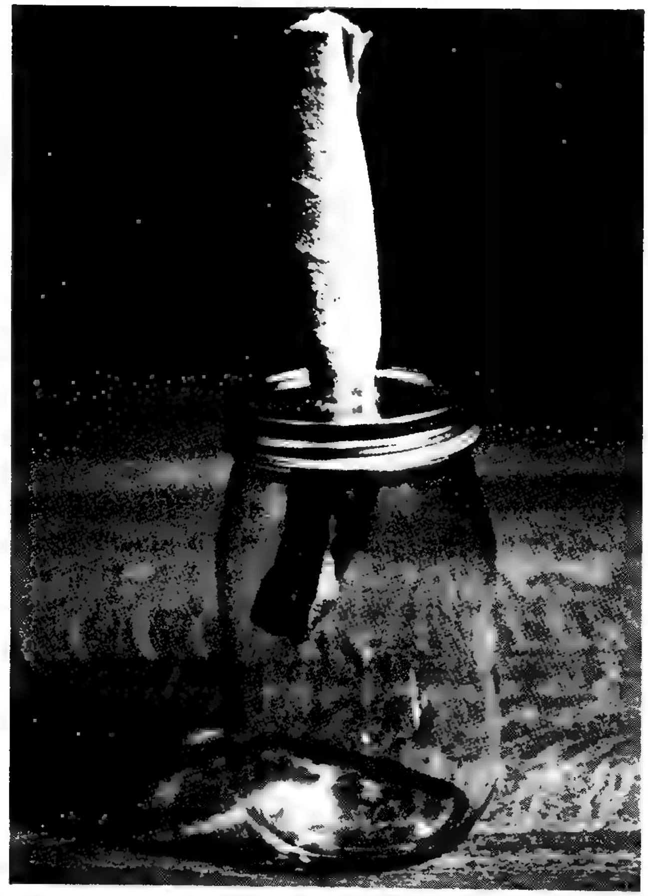
The solution is in making a hole in the lid that will support a wick. As with a bottle, it is important that the wick be able to plug the hole. The wick should be roughly the same size as for a bottle, though size is less critical since you make the hole it fits through.

Metal lids are easy to penetrate with a bayonet or knife; plastic lids can be penetrated with a hot iron, such as a spoon handle heated by a lighter. The easiest and best way to penetrate a metal lid is to lie the lid inside up on something soft, such as the ground; if there is nothing soft available, set the lid upside down over the mouth of the jar. Place the knife point roughly a half inch from the center of the lid, and push the blade through. Then place the point at one end of the cut you just made, and make a second cut of the same size, forming a "T" with the first cut.

The length of the cuts you make depends on the size of your wick; if your wick is a washcloth or something similar, keep the cut under an inch. If the hole you make is too small you can slowly make it bigger, but only until you can barely force the wick through it. If you accidentally make the hole too big, you can add material to the wick.

Some of the metal at the edge of the cut will have followed the knife, curling inward. Use your fingers to push it further in the same direction, turning the T into a triangle. Be careful that you do not cut your fingers on the very sharp edges, and be careful how you fold the metal, so that the three sides of the triangle are straight. The edges are left pointing upward.

Wick insertion in a jar is fast and easy if you know what you're doing. The wick is pushed through the hole from the underneath side, just far enough for you to have something to grab.



As with a bottle, it is pulled out around five inches just before use. The jar is shown empty for greater clarity.

The reason the cut is made from the inside of the lid is so that the wick can be fed through from the inside. That way the lid can be placed on the jar with just a little bit sticking up, and just before use pulled out, as with a bottle. The sharp edges from the cut will only allow the wick to be pulled one way, and there is no reason to fold them down.

As with a bottle, the wick has to fit very tight so that it doesn't leak. A good fit is a little more difficult to get with a jar because the wick isn't running through a nice round hole. But if the cuts are made right and the three sides of the triangular hole are straight and there is a good wick with a tight fit, there will be no significant leakage.

CHEMICAL IGNITION

One problem with the Molotov cocktail is that since it is in effect a lamp, it can give away the position of the one throwing it, both just before throwing and as it streaks across the sky. A chemical igniter will solve this problem, and also make the grenade much easier to use.

Use of a chemical igniter though greatly complicates the making of a Molotov cocktail, because the chemicals are not readily available, they are potentially dangerous to work with, and once they are mixed in with fuel, the device is armed. In most cases a wick will be used instead of a chemical.

Some times one chemical is put in a small bottle or jar inside a bigger bottle or jar, with the latter having a second chemical mixed with it, so that when both bottles break, the two chemicals mix, and ignite the fuel.

POTASSIUM CHLORATE/SUGAR AND SULFURIC ACID IGNITION

A self-igniting Molotov cocktail is made by mixing sulfuric acid with the fuel, and surrounding the bottle with paper or cloth soaked with a mixture of potassium chlorate and sugar. When the bottle breaks, the acid comes in contact with the sugar/potassium chlorate mix, which produces fire; this fire then ignites the fuel. The mixture is carried in water in a separate bottle. It is poured onto the cloth just before the grenade is thrown.

This ignition system is covered in more detail in Chapter 4; this section will explain how to apply it to a Molotov cocktail. This recipe is from an Army manual:

Using a funnel, fill the grenade bottle roughly two-thirds full of gasoline.

Again using the funnel, slowly and carefully pour concentrated sulfuric acid into the bottle, until the bottle is within an inch of being full. It is very important that the funnel be used, to direct the acid into the fuel in the center of the bottle. Once this is done, put the cap on the bottle.

Clean the exterior of the bottle thoroughly with water, to make sure there is no gasoline or acid on it. If you fail to do this, you might initiate fire prematurely when the second part of the mixture is added later.

Wrap a clean piece of absorbent cloth or several pieces of absorbent paper around the bottle; use string, rubber bands, or wire to hold it securely in place. This material will be saturated with a potassium chlorate/sugar/water mix just before the grenade is thrown, so leave a section uncovered for your hand. This part of the grenade is now complete; set it in a safe place until you are ready to use it.

Place six parts water into a glass or porcelain cooking pot, and bring the water to a boil.

Make sure that the container you are using for measuring is dry, then add one and a half parts sugar to the boiling water, stirring it in.

Put one part potassium chlorate into the boiling sugar-water.

Remove the pot from the heat immediately, and let the mixture cool. Then pour it into a half-pint bottle, using the funnel; make sure the funnel doesn't have any sulfuric acid residue. Put the cap on the bottle, making sure it is secure and tight. Then clean the outside of it with water to make sure there is no solution on it.

The chemical solution will settle to the bottom two-thirds of the bottle.

Make sure that this bottle is not stored or carried where it and the other bottle might break and come in contact with each other.

Just before you are ready to throw this grenade, shake up the bottle with the sugar and potassium chlorate mix and pour it over the bottle containing gasoline and acid, saturating the paper or cloth. From this point on, when the bottle breaks, it will burn.

The grenade can be thrown immediately after pouring the chemical igniter over it, while the paper or cloth is still wet, or it can be thrown after the mixture has dried. Once the mixture has dried though, it can be set on fire very easily, by flames, sparks, and even bumping and scraping. This makes it dangerous to handle, carry, and store, as well as very useful as a boobytrap device.

HOW TO CARRY MOLOTOV COCKTAILS

A breakable container filled with liquid fuel is an unhandy and potentially dangerous thing to carry. There are a few things that can be done to make it easier and safer.

A bottle or jar with a good lid on it is much safer and easier to carry than one with nothing but a wick as a stopper. If no lid is available, a balloon or condom (available at drug stores, truck

stops, prisons, and public schools) can be pulled down over the top of the bottle; it might need to be sealed around the mouth of the bottle with a rubber band or piece of string tied in a bow. This will contain the fuel and fumes, though probably not completely, and can be pulled off quickly when the weapon is to be armed.

Vapor given off by the liquid fuel will either seep out or blow up the balloon. If it does the latter, put one or more pin holes in the balloon. This will let vapor out (and the smell of fuel that goes with it) but is better than having a blown-up balloon on the end of your bottle.

Even when a Molotov cocktail is carried with a lid on, or has a balloon covering its wick, it should be carried upright in a bag. A bottle or jar can be made completely leakproof, but vapor pressure needs to be dealt with, as covered above.

To make a tight seal that will not vent, start with a lid that has good threads; wrap plumbers' tape around the threads several times; make a gasket out of something like an inner tube if you have to. See the section above titled "Vapor Pressure" to see how to keep from breaking your bottle or jar when you carry liquid fuel sealed in it.

Bottles not sealed with plumbers' tape will probably vent on their own, which means they will always be leaking fumes out the top a little bit, as long as the temperature is within the fuel's volatility range. They can be wrapped in plastic vegetable bags or cloth to keep them from contaminating whatever they are carried in.

If fuel-proof gloves are not worn when the bottle is thrown, the hands will probably smell like fuel, unless the bottle is wiped off very well just prior to use. Even then, the hands will still be contaminated. If you wear gloves, leave them in a burning pile when you're through with them.

Since a jar's lid has to have a hole in it for the wick, either the jar needs a second lid, or it has to be carried with a hole in the lid. Even though the hole is plugged with the wick, the jar will still leak slowly if it falls over, and fuel will evaporate out of the jar even if it doesn't, probably giving off a strong smell, and fumes that might be dangerous.

The best way to deal with this is to have two lids for the jar. Carry it with the uncut lid on, and carry the other lid with a wick stuck into it, extending about an inch out the top. To prepare the cocktail for use, exchange lids, making sure the wick extends down well into the fuel when its lid is installed; shake the jar a little to get the wick good and soaked with fuel, then pull out around five inches of it. Light it when ready.

Two incendiary grenades ready for transport or use. The bottle has its wick pre-inserted; the jar carries its wick in a second lid.

Jars made for home canning are easy to get extra lids for, and the lids are very good. Otherwise you need to find two jars of the same thing to get two lids. Some lids don't hold liquid in very well, but most should at least be adequate. With some jars it might be necessary to make a gasket out of plastic wrap or something.

If a second lid is not available, or if you want to carry the grenade in a more ready condition, cover the entire top of the jar with kitchen plastic wrap and seal it below the lid with a rubber band or string. Then fold the remaining plastic up over the top of the lid. Or stretch a condom over the lid, as with a bottle. Keep in mind that neither of these will be as leakproof as an uncut lid. The wick can be pulled out by tearing the plastic wrap as you pull or by stretching the condom, or either can be removed.

An even more ready condition is achieved by pulling four to six inches of wick up through the hole, flattening it over the top of the jar, and then covering it with plastic or rubber as described above. All you need do then is light it through

the cover. If you get a good enough seal that pressure builds up, let it off with a knife before setting fire to it.

If a Molotov cocktail is carried in a pack or bag, it should be packed so as to keep it from banging into something that might break it, and it should have padding around it, to protect it and to protect the bag from its leaking. As long as it is secure and the sides are padded, the top can be left more or less open, so that it can be accessed quickly. Newspapers, foam rubber, clothing, and similar things can be used for packing.

A bag designed to carry fragile, expensive equipment, such as a camera bag, can be used to carry one or more breakable fire grenades. Since the thing being carried is not what the bag was designed to carry, some added padding will probably be necessary. Even with such a bag and added packing, be careful not to bang it around. A bag that can be dropped or thrown away quickly is safer than a bag that is attached to your body, such as a backpack or buttpack.

A large purse can carry one or a few Molotov cocktails packed inside and not look suspicious.

Molotov cocktails are more dangerous to carry than other weapons, because they are made of glass and filled with flammable liquid. A padded case, such as this camera case, makes carrying easier and safer, as well as inconspicuous.

The best purse to use for this would have a fairly stiff bottom and sides, and a shoulder strap, to make it easier to carry the weight of the fuel without appearing to be carrying more weight than is usually carried in a purse.

A belt or so-called fanny pack can carry a Molotov cocktail packed into it and not look out of place. The bottle has to lie down, so a good-fitting lid with a good gasket inside is essential. Depending on the fuel, temperature, and type of bottle, it might only be carried in a sealed condition for a period of time before it will break, unless the bottle has the strength to contain the fumes.

Carrying napalm in breakable containers in a pocket is even more dangerous than carrying it in a bag; a broken bottle of napalm in a pocket will quickly saturate your clothing. Any spark, even a cigarette, or a muzzle flash from your own gun, might turn you into a human torch. But a time might come to you when not carrying a Molotov cocktail in a pocket is even more dangerous.

In such a case, a flat bottle, such as the kind pints and half pints of liquor come in, is usually the easiest to carry. Such bottles are often carried concealed by people who like to drink where they are not supposed to. Some people even carry them in their boots, which is probably where the term bootlegger comes from. Some salad dressing comes in flat glass bottles.

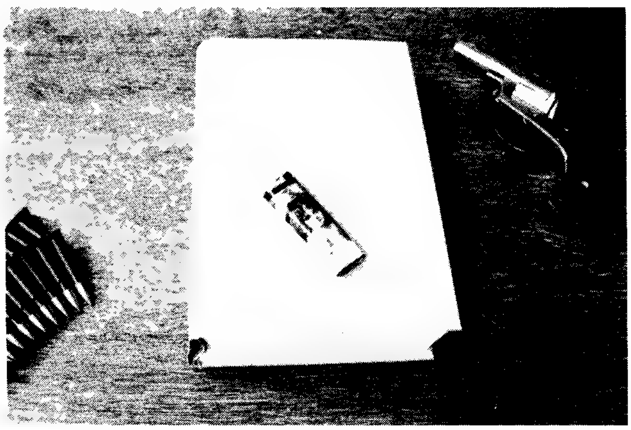
Virtually all bottles and jars are filled in a factory, then sold in a retail store. The same means that are used to carry them from the factory to the store can be used to carry them after they have been refilled with fuel. Most of the time they are carried in heavy cardboard boxes, usually with cardboard dividers separating them and keeping them from moving within the box and hitting each other.

Boxes of this type can be found at places that sell things that come in jars and bottles, such as grocery stores and liquor stores. Among the sturdiest ones are the ones that carry expensive alcoholic beverages. The best boxes to use are often the ones designed to carry the same bottles or a little bigger bottles than the ones you want to carry. If a box has openings that are too big, a newspaper or other padding can improve the fit; if the openings are too small, the box dividers are of little or no use unless you can remove some panels, though you might be able to squeeze some bottles in with the box as you find it.

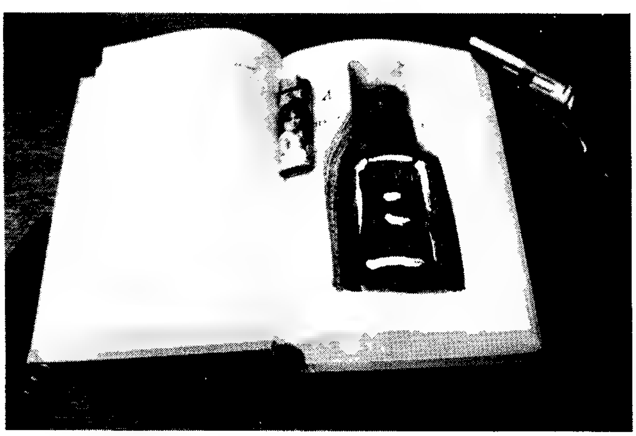
Dark glass bottles with their lids on carried in the container designed to carry them can be carried in the open and not look out of place. For example, a guy who appears to be carrying a six-pack of beer might actually be carrying a six-pack

of Molotov cocktails. The color of beer is similar to the color of gasoline, so even clear bottles would work if it wasn't for the wicks. Dark napalm, dark glass, a label, and a six-pack carrier should hide a wick from all but close scrutiny. Six wicks could be carried in a pocket, though inserting them in the field is time-consuming.

A bottle can be carried hidden in a book by cutting its shape into the pages, so that when the



Things are not always what their cover makes them appear to be; the most innocent-looking thing can contain much that is deadly.



Even a Molotov cocktail small enough to be carried in a book can start a big fire, if applied correctly. Flat alcoholic beverage bottles fit well into thick books.

book is closed all that can be seen is the cover and the edges of the pages, and when it is opened the bottle is inside, as though in a box. Use a book that is a lot bigger than the bottle, and use a flat bottle, such as a pint or half pint. Make the cut from a quarter to a half-inch bigger than the bottle all the way around. Use a book that doesn't stand out, and is approved by whoever is in charge of the area you will be carrying the book through.

If you carry a Molotov cocktail and don't want people to know it, make sure that neither it nor your hands smell like fuel. This means you don't want to be carrying something that is venting fumes. If you or your hands smell like gasoline it might be because you spilled some on them when you filled your car or lawnmower, which isn't uncommon, but there is no sense in attracting attention to yourself in the first place.

WEAPON EMPLOYMENT

In order to be effective, a Molotov cocktail has to be broken; otherwise it's just a lamp. To be broken, it has to strike against a hard surface; how hard and direct the strike has to be depends on how thick the glass is.

A Molotov cocktail can not usually be used to attack a person directly by throwing it at him, because it will be unlikely to break when it hits him, though it might break when it bounces off and falls to the ground, depending on the surface it hits. A lot of bottles get broken over people's heads, but it's a hard target to hit; the bottle has to hit right to break. People are usually attacked with Molotov cocktails by throwing the grenade so that it breaks under, next to, or above them. People are most vulnerable to attack by Molotov cocktails when they are in a confined space, such as a room, bunker, or vehicle.

If you are ever unfortunate enough to have to attack a fortified position, your job might be easier if the position is on fire. The problem of course is in how to get the fire to the position. A Molotov cocktail is one possibility.

The amount of fuel contained in a Molotov cocktail is very limited. Often the purpose of it is to bring fire to some secondary fuel, as in setting a building on fire. Sometimes a few or many are used against the same target. For example, if you are engaged in battle with an enemy inside a building, you might do well to throw as many Molotov cocktails through windows as you can; a big fire is dangerous, but in some cases maybe less so than going room to room to clear snipers.

To reduce your vulnerability to sniper and other gunfire, lob grenades over barricades.

When you throw straight, reduce the time of your exposure as much as possible and vary your throwing position if you can.

Darkness is not cover because the grenade is a lamp, unless it is chemically ignited. But only one or a few have to be burning when they are thrown; others can take their fire. Darkness can be used to get into position, but once you light the lamp, you're on stage and the show is on; the grenade's arc will draw a line aiming toward you.

Only one grenade per room (not necessarily the first) needs to be burning when it is thrown. A crew throwing several Molotov cocktails through different windows will get several big fires burning, that will quickly converge into a mass fire.

Even with a strong arm behind it, a Molotov cocktail has very limited range compared to firearms and other projectile weapons. If two or more people are involved in an attack on a position, it is often useful for the group to divide into two crews; one crew shoots at windows and other openings in the wall of the position so that the enemy is denied access to those areas. Shotguns and automatic rifles can be especially good for this sort of suppression. As one crew suppresses enemy fire, a crew of firemen moves in close enough to employ its fire grenades, preferably from behind cover.

Molotov cocktails can be used in a number of ways to control enemy movement. For example, if there is an area where an enemy will have a good field of fire into your position, you might be able to set that area on fire, and so deny him access to it. Fire and smoke are often used to drive people out of fortified positions, as suggested above. Fire grenades can also be used to deny passage through certain exits, so that your enemy has to leave by a route chosen by you (or stay inside).

Another way to control enemy position is to start a fire in an area you can cover, so that your enemy has to either expose himself to your bullets, or let the fire you set burn (unless he is lucky enough to have a means to put it out from a distance). If he has a good reason to put the fire out, for instance if he is in the building that is burning or it is his supplies that are burning, you will have given him a mission, forcing him to come to you, on your terms.

TRUCKS AND CARS

Motor vehicles can be attacked with Molotov cocktails; liquid fuel burning on the outside will make it hot and smoky inside if there is enough fuel. The fire can obscure vision and rob oxygen from the engine. If there is any opening in the vehicle, such as a broken or open window, fuel will get inside, and if there is enough of it, the occupants will either get out or burn (or both).

The best target for a Molotov cocktail is probably the windshield, because burning fuel on it will blind the driver; he might be able to see somewhat by looking out through the side window (unless it's burning too), but he won't be able to drive very well or very fast that way.

Any of a vehicle's windows are good targets for a Molotov cocktail if the fire grenade is followed immediately by a brick; this will allow burning fuel to flow inside.

A Molotov cocktail thrown through a broken or open window will be very effective if it breaks. To do that it has to hit something hard enough to break it, and there are a few things inside a vehicle that are that hard. A human head is that hard, if the bottle hits right. If you can throw your grenade through one open or broken window and hit the inside of another intact window, the grenade should break.

If you can get enough fuel directly on the engine you'll kill the vehicle by robbing it of oxygen; the fire will also ruin wiring and hoses, and might get the engine oil burning. Burning fuel on the grill and hood will probably not kill the engine unless there is a lot of it, though it will obscure vision.

ARMORED VEHICLES

Molotov cocktails can be used against armored vehicles. According to FM 21-75, *Combat Skills of the Soldier*, "[Flame devices] are used to obscure the vision of a vehicle's crew and to set the vehicle afire. The burning vehicle creates smoke and heat that will asphyxiate and burn the crew if they do not abandon the vehicle."

By far the most effective way to employ a Molotov cocktail against an armored vehicle is to throw it through an open hatch; inside, contained by the heavy steel shell, the fuel will turn the chamber into a furnace. Anyone inside will be seriously injured or killed very quickly, by smoke and heat inhalation and oxygen depletion

as well as direct heat. The intense heat is also likely to set off ammunition and fuel.

The problem of course is in getting the occupants of the vehicle to open their hatches for you. On a buttoned up vehicle, if you can get close enough to hit it with a Molotov cocktail, aim for the grill covering the air intake manifolds, located at the back of the tank. Burning fuel can kill and seriously damage an engine, turning the tank into a bunker. Spilled over sealed peepholes it can obscure vision, possibly causing the tank to wreck. Burning fuel will drip through any openings in the tank, no matter how small.

DIRECT APPLICATION OF FUEL

Sometimes the best way to deliver fire is to apply fuel directly. The fuel might be applied and then ignited, or ignited and then applied. In either case, the fireman must overcome the defenses of the one to be burned, and he must place the fuel where it will do the most harm to the enemy.

There are exceptions to this, for example, fuel in one place might do less harm than in another place, but it will do enough harm, and the inferior placement might make the fire appear accidental, which might be necessary on a sabotage mission behind enemy lines.

In most cases though treat fire like a bullet, in order to use it to its maximum capability. What that means is, use it as efficiently as it can be used: aim for the enemy's most vital organs. When the fuel is applied directly, it can usually be applied more precisely than with other methods.

THE TECHNIQUE OF SYSTEMATIC ARSON

Arson is the deliberate act of setting fire to property. Under normal circumstances it is a crime, and a very serious one, which sometimes even includes murder. But in war it is a valuable device used by heroes, to kill an enemy and ruin his devices. This is the technique.

Anyone who has ever tried to start a campfire without using liquid fuel has learned that starting a fire is not always an easy thing to do. It's amazing that so many fires get started accidentally, even by children. To set fire to a building or other property, that gets big enough fast enough to do significant damage, and kill enemies before they can get out or be rescued, is not always a simple thing to engineer. Even a simple smoldering fire to poison enemies takes knowledge of and skill in controlling air drafts, finding toxic fuels, and things like disabling smoke detectors and smoke dampers in ducts.

Even given the above, setting a deadly and destructive fire in a building can be the easiest thing in the world, because so much of the engineering has already been done (i.e., fuel piped in, etc.). But you still need to know what you're doing to do it right, which means getting the most good from what you have available.

Doing it right means bringing together fuel and heat, and making sure that neither of them are left lacking as the fire grows. In some cases you also need to regulate air supply. If you pour a cup of fuel in the middle of a floor where there is no fuel in reach of its flames and set fire to it, the fire will probably just burn itself out. But if you pour several gallons of fuel on furniture and other secondary fuels piled in corners and at the bottom of staircases, you know you will have a big roaring fire very quickly, that will not die, before burning all available fuel, which means burning down the house.

So if you want to burn down a building, make sure you use plenty of intermediate fuel to get the fire off to a good start, and choose a location or locations that will concentrate and reflect heat, as well as let the fire spread. Use fuel that burns long and hot; use things like corners, shelves, and tables to concentrate and reflect heat. If you have liquid fuel it should be applied to either the ground level or basement level, wherever there is better secondary fuel, and it should be allowed to soak into things like furniture, carpet, and wood.

The more volatile the fuel you use is, the more likely it is that there will be one or more explosions more or less immediately after the fire starts. A lot of amateur arsonists who didn't know how volatile and explosive gasoline is have been killed in such explosions. If you want fire with no explosion, use fuel with low volatility, like kerosene; such fuel will usually be labeled COMBUSTIBLE. Even with such fuels, it is usually better to be somewhere else when the fire starts.

In many houses and buildings, all you have to do is open a gas line, and let it run for awhile before setting fire to the fuel. This can lead to fire

and explosion both. You definitely don't want to be there when ignition occurs, so you need to use a timer, remote, or boobytrap (see Chapter 6 for more on these).

If all you have is solid fuel, a fire will grow more certainly and more quickly if the fuel is improved, usually by breaking and piling up furniture, ripping and bunching up fabrics, wadding up paper, and building it all into the shape of a campfire, with wadded up paper and other kindling material at the bottom. In a corner against two walls that will hold and reflect heat is a good place to do this; the best place though is often the innermost stair well, which will act as a chimney.

This chimney will make a fire grow big and hot quickly (providing there is adequate fuel); the fire will be carried mostly upward. Staircases are often escape routes, so fires in such areas will greatly increase enemy casualties (especially if the fires produce massive amounts of toxic smoke).

To get a good fire going quickly, set fuel in a pile with plenty of air spaces. Use walls to concentrate and reflect heat. In this fire set in a corner, crumpled paper and cardboard and bunched up clothing act as tinder and kindling to get wood and plastic burning.

A corridor is a horizontal chimney. A good place to set a corridor fire is where two come together. Low ceilings concentrate heat better than high ones. All doors in the corridor should be open if possible.

Usually there is a variety of fuels. Study Chapter 2 so that you can quickly identify all of the fuels wherever you are, and use all of them to their fullest capability to build the best fire you can. For example, in a house you might wad up a pile of newspapers, then rip some wood molding loose and lay it crisscross over the wadded paper. Over the wood and paper you pour cooking oil, motor oil, varnish, rubbing alcohol, and every other liquid that will burn. A few big pieces of furniture might be stacked over this pile, in such a way as to insure that they will not collapse and smother the fire as they burn.

A few smaller fires that will converge usually lead to better fires than one big fire made from the same amount of fuel. But if you don't have very much fuel it might be better to put everything in a single pile, or you might want to attack a certain room or egress point first and most.

An easier technique than the one just described is to just go around with a Zippo lighting all the curtains, and letting the fire take care of itself. Cigarettes left lying on furniture cause more fires than anything. But not all fabrics burn well, and those that do don't always produce enough heat to spread. The amount that fuel has to be rearranged is determined by how it is arranged in the first place, how much of it there is, and how quickly you want the fire to develop.

Since heat rises, the fire should be set low in the building, on the first floor or in the basement; the basement is usually the better of the two, if there is adequate fuel and one or more good vertical passageways. It should be set under chimney mechanisms like staircases and laundry chutes, with all upper doors open. On the ground floor, it should burn at escape routes and staircases, which might be one and the same thing.

It is well known that how well the components and furnishings of a building burn is affected by their moisture content. So the less humidity there is in the air, the better a building will burn.

Moisture content within buildings is not as significant a factor as it is outside of buildings, such as in forest and grass fires.

When setting fire to a building from the inside make sure you don't paint yourself into a corner and get trapped by your own fire. As you dispense liquid fuel, work from the innermost point outward; a pilot light or even static electricity might ignite fuel prematurely, so dispense it just before you leave, and make sure you don't have to walk over an area that has been doused with fuel.

If people are the target of a building fire, set fires at escape routes. Here fuel is piled on a set of stairs below an exit; a jug of liquid fuel with a flare taped to it will get a big fire going quickly, shortly after the fuse is lit. The chimney effect of the staircase will quickly fill the area leading to the door with flames, smoke, and poison gas. This is probably the door the fireman will leave through, lighting the fuse on his way out.

Fuel should be concentrated in corners and staircases, and if a building's inhabitants are to be targeted, at escape routes. Small amounts of fuel, referred to as trailers, are poured to connect the pools. Or a fireman can start several fires as he moves quickly through and out of a building, after having set each one up if necessary.

BALANCING AIR FLOW AND HEAT RETENTION

Air is as important to a fire as fuel, but usually there is plenty of air occurring naturally, so providing it is not as big a consideration. Any ventilating of buildings needs to be done right, so that you don't let the fire's heat escape. Few homes and buildings are airtight, and a fire will usually be able to suck enough air through tiny holes to grow big. When it gets hot enough or when explosions occur, windows will break. But more air initially will still make a faster-developing fire. The amount of air holes put in a building by an arsonist, if any, have to be determined for each case; some buildings are a lot tighter than others, and the purpose of the fire always determines how it is set.

If the only or main purpose of the fire is to kill people, there shouldn't be any holes, because you want the fire to use up all the oxygen and fill the house with smoke and poison gas. If you want the fire to burn as long as possible without being detected, you also obviously want to hold as much smoke in as possible. You might want to crack a few basement windows so that the fire can suck air and get bigger faster.

If the purpose of the fire is to destroy property, you will probably want to do some ventilating, but be sure that you don't let so much heat escape that you do more harm than good, especially toward the beginning of the fire. Since heat rises, holes toward the base of a fire will let in air but not let much heat escape. Broken windows higher up will let smoke out, making room for more air, but will not let much heat out. Holes should not be made in roofs, though they are typically made there by incendiary bombs dropped from aircraft.

The easiest and best way to make vent holes is to open or break out windows; they don't hold in heat as well as walls, and are easier to break through. Remove curtains that might inhibit air flow.

Think about turning the building you want to burn into a wood stove or barbecue grill. Air flow will nourish the fire, but if there are too many openings or they are too big, the house will be more like a camp fire than a wood stove. As a camp fire it will burn very well, but heat will not build up as fast or as intensely.

Since open windows let heat escape, they are a primary mechanism of fire spread between buildings; this can be good or bad, depending on the situation.

As long as there are open passageways within the building, both vertical and horizontal, breaking out lower windows on one side and upper windows on the other will result in good air flow through the house.

You want to make sure the heat that the fire uses to propagate itself is contained as well as possible in the building you want to burn; once it escapes into the air it doesn't do any more good, except in spreading the fire and hindering firefighting. Trapped heat will allow the fire to spread quickly to the entire building (providing there are suitable passageways and fuels for it). So the shell of the building should remain more or less intact, especially toward the top, for a good fire.

Fans and ducts will help ventilate a fire until the fire shuts the fan down. Smoke and heat will continue to move through the ductwork after the fans shut off, unless the ducts have fire dampers. Air moving systems can be used in a number of ways; in arson they should be turned on and set to run steady. If you set the thermostat for heat the heat of the fire will very quickly cause the thermostat to shut down; if you set it on fan alone or air-conditioning it won't shut off until the fire kills it.

If a building has a fireplace, the chimney will move smoke out of the house if the damper is open. If you want the house to fill with smoke quickly, close the chimney damper, otherwise leave it open.

The inside of the building should be as open as possible. All inside doors and other partitions should be open. The importance of this can be seen in fire codes saying that certain interior doors, known as fire doors, are always supposed to stay closed; propping the doors open for convenience is a violation of fire code. This is because the doors will greatly slow the movement of smoke and fire.

Openings between floors are especially important. Usually there is little an arsonist can do quickly in this regard, except for making sure that all passageways between floors are open. These would include doors at the top and bottom of staircases, trash and laundry chute doors, and elevator doors if possible. It might be possible to cut a few holes in floors with a chain saw, or rip a few boards loose with a claw hammer or screwdriver or pry bar, or even blow a few smoke holes with a shotgun. There is usually at least one subfloor.

Put holes where they will do the most good, which is over a fire you start directly below them, or somewhere to channel smoke to your enemy. For example, if you are engaged in mortal combat with someone upstairs in a house when you are in the basement and you have a shotgun, you might start a smoldering fire and then blow several holes in the ceiling under where you want the smoke to go. Make sure you have fresh air and a way out.

If you have time to turn a building into a trap, a trapdoor inside an escape door leading to a fire below would allow one of perhaps many opponents to open a big passageway between floors for the fire to spread through, and just inside an escape route would be a good place for the fire to spread to. The person falling through the trap door can be the action that activates the fire. For more on this see Chapter 6.

ARSON WHEN ENTRY TO A BUILDING IS DENIED

Given the above, it is clear that setting fire to a building is far more difficult if it has to be done from the outside, but sometimes a situation dictates that this is the way it must be done. Unless it is made of paper or straw, just setting fire to the outer shell of a building will probably not have much effect, unless the fire is real big. The most effective way to severely damage a building and kill the people it shelters is to deliver the fire to the inside.

Doing this from the outside means that you have to break through the shell of the building to deliver the fuel, and you can't improve the fuel or heat and air flow capabilities of the inside. So, all other factors being equal, you can't build as good a fire. But you might be able to build one that is good enough.

There are a few ways to deliver fuel deeply into a building. One is to use Molotov cocktails, as covered earlier in this chapter. They should be thrown through windows, so as to break well inside the building. Intelligence of the inside of the building can greatly improve their effectiveness. Such intelligence is in regard to the location of inner walls and staircases, fuel, and occupants.

Another method of setting fire to a building from the outside is to run one or more pipes or hoses inside. These can carry gas or liquid fuel. If enemies are inside a structure and you can get access to a fuel truck, for example, you can deliver a lot of fuel into the building quickly by running the hose inside and turning it on. Likewise, a garden hose can be used to siphon fuel from a car or any other gas tank into a building, if the tank is close enough. Ideally, the hose should be run through a basement window, but any lower window will work. Let it run for awhile before igniting the fuel (a pilot light might take care of ignition for you).

Whether the fire is set from inside or outside, if there are people in the building targeted by the fire, it should begin in rooms with access to a way out of the building. Pouring or stacking fuel just outside or inside of exit points and setting fire to it will deny escape to the occupants. Since elevators are extremely dangerous to use in a fire and their use is always recommended against, staircases are the primary method of escape for people on upper floors; stairwells are also the main way smoke and heat rise though a building. So fire should be set at or close to their base if possible.

Setting fire to things like crops in a field usually requires that certain conditions be present. The crops need to be dry enough to burn, and since there is no building to contain the heat, a wind is usually necessary to spread the fire. When such conditions are present, the fire is set at the extreme edge of the field on the side the wind is coming from, so that the wind will carry it over the entire field. In order to keep hidden as you do your work, you might need to move a little toward the inside of the field, but start the fire as close to the edge as is practical.

The deliberate burning of bridges used to be common enough in war that the term "burning bridges" became well known, and is still used to this day as a figurative expression. New bridges though are usually made of steel and reinforced concrete, which don't burn. Old wooden railroad bridges will probably burn; many have been treated with fire-retardant chemicals, but with enough heat they will probably still burn.

Vehicles are susceptible to damage by arson, and can be rendered useless until they are repaired (if they can be repaired). The interior will burn; belts, some hoses, and electrical components in the engine will burn, rendering the engine inoperable. Tires will burn, rendering the vehicle immobile. Use the vehicle's own fuel supply by breaking into the gas tank or siphoning fuel from it. Break into the gas tank with an ax or similar device or take apart or break into the fuel line; open the tank fill port for ventilation and let fuel drain out by gravity.

IMPROVISED FLAME-THROWERS: SPRAY CANS AND BOTTLES

Many aerosol cans contain flammable liquid, which is forced outward a few feet or so when the spray button is pushed. Such cans are ready-made flame-throwers, that need only a source of ignition to be employed. They are not anywhere near as big or powerful as the factory-made flame-throwers used by military forces, and their range is very short, but in the right situation, one might be powerful and long-range enough to be an effective weapon. They are to their military cousins what a screwdriver is to an assault rifle: the latter is definitely the more powerful weapon, but the former can still be very useful.

Aerosol cans that make good flame weapons are easy to spot because they are clearly labeled. The label is toward the bottom of the can, and it says: DANGER: EXTREMELY FLAMMABLE, or DANGER: FLAMMABLE; if it says COMBUSTIBLE, or says nothing about flammability, it's probably no good as a flame-thrower. If it is caustic it can burn the eyes and respiratory system and hands without fire. Any spray might blind or distract an adversary for long enough to finish him with another weapon. But to be very useful as a flame weapon, it has to say DANGER and FLAMMABLE.

An aerosol can will also say: CONTENTS UNDER PRESSURE; virtually all sprays that are flammable come in this type of can. Spray cans and bottles not under pressure are pumps. They transfer force from the finger or thumb to a pump

that mechanically propels outward a given amount of the reservoir contained by the can. Pressurized cans simply have a button that opens a valve, letting the pressure squirt out the can's contents at a more or less steady rate, until the valve is closed, by release of the button. Pressurized cans are automatic; pumps are manual.

It's easy to tell the difference between a pump spray can and a pressurized can: the former has a large and more or less conspicuous pump mechanism; the pressurized can just has a little button. If in doubt about which type a can is, read the label; a pressurized can will be labeled as such. Or simply push the button and see what happens.

PUMP SPRAY BOTTLES

Extremely flammable liquids are extremely rare in pump cans and bottles. But a good pump spray bottle that puts out a good burst still does a good job of dispensing its contents if you are good enough to make it work. This means first emptying one and filling it with flammable liquid. Thickened fuel can not be used, though a little oil might be added to a good bottle with a heavy-duty pump.

Filling a pump spray bottle with fuel is difficult because the pump apparatus at its top makes the bottle need to have a small mouth. You don't want to spill fuel on yourself or the outside of your weapon; wipe it off very well if you do. A funnel makes filling easy. If you don't have a funnel you can make one by cutting the top several inches off the top of a plastic bottle with a smaller mouth than the one you are trying to fill. Paper, cardboard, and thin plastic can be folded, rolled, or bent into an adequate funnel.

Putting a liquid into a plastic bottle that isn't specifically designed for that particular liquid might cause the spray mechanism to malfunction. A sticky liquid or one that is too thick might plug something up. And some liquids eat plastic, and might destroy parts of the pump or eat through the bottle. This however is unlikely with common chemicals; if the bottle you are pouring from is plastic you're probably safe. Things that eat plastic will usually say so somewhere on the label.

A bottle with a big trigger-like lever powering a pump can be a fairly good flame weapon if it is loaded with good fuel and you are coordinated enough to use it. You need to activate the pump fast, hard, and repeatedly to get good delivery of fuel to the target, and you need to have good timing and coordination between the spray action and the ignition action; such timing and coordination is much simpler with the continuous, effortless spray that comes from aerosol cans.

Spray bottles with a nozzle that can adjust the spray pattern can produce either a shotgun- or rifle-like pattern, with the latter having up to fifteen feet of extreme range, and the ability to concentrate fuel and flame on vital targets (i.e., eyes, nose, and mouth) at closer ranges. The shotgun pattern is of no use. Bottles with adjustable nozzles are usually the ones sold empty to be filled; this type of bottle is usually far better made than the ones that come pre-filled.

Good pump spray bottles can often be found in places where cleaning and garden supplies are stored and in places where work is being done, such as auto shops; bottles in such places might already have good fuel in them and not be marked. These are most likely to be found where cleaning is being done. If it smells like it might be flammable and you have fire it isn't hard to find out if it is. If you don't have fire it might still be a good idea to carry the bottle along in case you get fire. Even an empty spray bottle might be worth picking up, in case you find a store of liquid fuel and an igniter later.

If you fill a pump spray bottle with fuel, keep in mind that the tube leading from the pump to the bottom of the bottle is probably still full of whatever was in the bottle before. The first few times you activate the trigger, it will be that instead of the fuel that comes out. When it comes time to use the weapon, every shot is important, especially the first ones. So be sure to pull the trigger enough times after filling the bottle to be certain that the tube is filled with fuel.

In the closet of a custodian you will find very good spray bottles, but probably nothing that is extremely flammable. Such bottles though can be filled with fuel that you find somewhere else.

Bottles found in custodian closets are likely to contain chemicals that are far more caustic than cleaners sold to the general public. These can burn the eyes and respiratory system very effectively; they will also burn the rest of the body, but are unlikely to stop an attacker unless they hit the eyes or get into the lungs.

Sometimes the chemical in the bottle is pure but often it has been mixed. So if you have time, find the most caustic liquid chemical in the closet and fill the best spray bottle you can find with it. If it is already in a spray bottle you can judge its relative strength by comparing its color to the color of the same chemical in the original container. Find out which chemical is the most caustic by reading labels if you have enough light, and by opening them and holding them close to your face to see how the fumes affect you. Don't stick your eyes or nose over a bottle of caustic substance though and don't take a deep breath.

A pump spray bottle works well in a somewhat horizontal position as long as it is full enough for its contents to reach the bottom of the feed tube; it will not work upside down. Most aerosol cans don't work in horizontal or inverted positions, but some do.

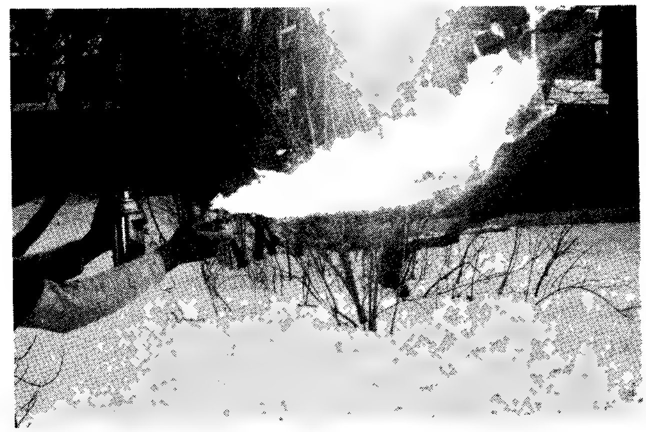
A variation of this weapon is a squirt bottle, such as the type used to hold and dispense dish soap, lighter fluid, and many other liquids. This is not a very good weapon because it has very short range. But it might be the best weapon you can get your hands on, and you might be able to make it work well enough.

Squirt guns could work very well for this purpose but most are made very cheap and leak so badly that they would be very dangerous to use. If you have one and there is nothing better, at least try it out with water before you try to use it. A big gun that delivers a lot of liquid, such as a Super Soaker, is potentially very powerful as a flame thrower, and also very dangerous to the user, because of the large fuel reservoir.

AEROSOL CANS

The best aerosol can flame-throwers are certain penetrants and lubricants like WD40, engine starting fluid, and carburetor and choke cleaner. These produce very good flames and have relatively good range, usually up to five feet, though at their extreme range they have limited effect, because the fuel has all burned by the time it gets to the target. Many paints, hair sprays, and some furniture cleaners are also very good, as long as they have the right words on their label. Some polyurethane furniture finishes are extremely flammable; the carrier burns and the polyurethane (plastic) sticks to the target.

Paint does not need to be shaken to be a good flame weapon, but if there's time it's better to shake it. The carrier is the primary fuel component of the paint, but the pigment will also burn and will stick instead of evaporating right away, as well as helping to blind the subject. Paint can also mark a target, for future identification if necessary, though a burn will mark him even better.



A can of WD40 and cigarette lighter together make a good flame-thrower. The igniter should be held well ahead of the can.

IGNITION

One of the best fire-initiators for this flame-thrower is a cigarette lighter. Childproof lighters will work fine as long as you don't forget what you're doing when you're under stress. If you have an adjustable-flame lighter, set the flame as high as you can; it will be easier to hit.

Matches are less useful because they are not easy to light with one hand (see Chapter 4 for more on this), and because getting wet, as from fuel or sweat, renders them useless. Instead of using the one-hand ignition method for book matches, it is probably better to hold the match book against the can with the thumb of the hand holding the can. Either way though, you will have to take your concentration off your opponent to light the match.

A candle works well if it has a big enough flame and you can be still enough, as in a surprise attack, but it would be a real good idea to have a lighter as a backup in case it goes out. A propane or other strong-burning torch is way better than a candle because it is less likely to blow out and it makes a bigger flame that is easier to hit. A liquid fuel lamp with an exposed flame

can also be a source of ignition; a burning Molotov cocktail in one hand might be used in this way, with the Molotov cocktail perhaps used to finish what the flame-thrower starts.

A spark-maker, such as an empty cigarette lighter or torch striker, can ignite sprayed fuel, but not easily and not reliably, so it is of little or no use, though you might be able to use it to ignite a torch. A flare or flare gun can initiate fire after you have sprayed somebody down. There are cases of people accidentally igniting hair spray with a cigarette, but as an igniter a cigarette is of no use because it is difficult and unreliable.

No matter what the source of ignition, a backup source will make the weapon more dependable.

Once your opponent has burning fuel on him, use that as the source of ignition, and delivery will be greatly simplified.

WEAPON EMPLOYMENT

The essence of technique with this weapon is to use the device to deliver as much fuel as possible to the most vulnerable part of the target as the device will allow, and to coordinate ignition with delivery so as to allow as much fuel as possible to burn the target. Spray cans and bottles do not put out a large volume of fuel, so what they do put out needs to be used efficiently.

This means getting as much fuel as you can onto the face of your opponent. As the fuel burns on its way to the target it is consumed. So hold the igniter as far as is practical from the source; this is far safer for you as well. Spray as much fuel as you can before ignition, and if your opponent has any fire on him take your own igniter away and spray the fire, using the spray also to direct the fire to vital targets, if it is not already at them.

With a can it's best to start the spray first, then bring the flame to it, holding the flame at least several inches in front of the can. Starting the spray first before lighting it will allow you to see where and how far it will go; there is a lot of difference between the patterns put out by different spray cans, and you want to be able to make the best use of the pattern you have. Test the pattern beforehand if you can.

You also don't want to spray your hand, or put out your flame by spraying it directly. Once the spray is ignited, it will usually continue to burn on its own, though it might need to be relit. It shouldn't try to creep back toward the can, but you should check to make sure it doesn't.

With a pump bottle you need to hold your ignition source and hit it with the spray. Since you can see the spray it's fairly easy to be a good shot with it. Hold the igniter out at arm's length, in line with your target as though it is the front sight of a handgun. Aim for the very top of the flame. If you are effective with the weapon you might only need to light one squirt; the rest will be lit by the fire on your opponent.

Sometimes a little burning fuel will get on the hand gripping the igniter; as long as it's just a little spray it can be put out pretty easily and it isn't a big thing. But more than a little spray can burn your hand and perhaps even make your butane lighter explode. So make sure you're a good shot with a squirt bottle before you try this with gasoline. Squirt bottles are good and common tools, so many people are good shots with them already. For those who aren't, water is cheap, so it's easy to get good.

You need to watch the can or bottle to make sure it doesn't start burning. Don't forget that you are holding a large supply of fuel in your hand, and a plastic bottle especially is not well protected from heat. If you screw up you might be the one covered with burning fuel instead of your opponent.

Low power spray flame weapons like these work poorly if the air is not perfectly still. Wind makes it hard to get a flame out of a lighter, and also disperses the spray. If there is a breeze when you use this weapon, don't spray into it; if you can, use the breeze to carry the fuel to the target.

This weapon should be used from as close a range as practical, because fuel is lost and consumed as it travels to the target. But if someone with lethal intent is advancing on you, it's just as well to start spraying as soon as he is within your extreme range, though you might not initiate the fire until he is closer.

The most efficient way to use a spray flame weapon is to spray as much fuel as you can on your target before setting fire to it. This works especially well with spray oils like WD40, that will stick to the target and then burn like napalm. It won't work well with things like spray paint, because most of the flammable part of the mix will evaporate right away.

To accomplish this in a tactical situation you need to be able to surprise or outmaneuver your adversary, or have some kind of barrier between him and you. You might use something like a garbage can lid as a shield as you spray for several seconds, for example; this means you would need to hold the lighter in the same hand that holds the shield, and when you want to set fire to the fuel, turn the shield sideways. Or you might be spraying somebody who is climbing through a window to attack you. You might be able to surprise an opponent, or spray for a few seconds into the face of an aggressor who is momentarily sleeping or not paying attention.

Used in this way, a spray can and lighter might allow you to keep a fight from happening, or you might be able to take someone prisoner instead of killing him (which will allow you to turn him over to the police, or ask him questions). Saturate somebody's face and hair with WD40, then point the can away from him and shoot a flame into the air to show how close he is to becoming a human torch; the sight and sound of this flame weapon is pretty dramatic, especially to someone who knows he's saturated with the same fuel that he sees burning. He'll probably try to wipe the oil off right away, if he has anything to wipe it off with; as he does this, you simply continue to spray him down. If he continues to press his attack, you might eventually need to torch him. Just make sure he doesn't get a hold of you first.

By far the best target for this weapon is the face. One reason for this is that a face full of fire will blind a person, either temporarily or permanently, depending on how much fire and for how long and whether or not there is any protection for the eyes, such as glasses. Fuel in the eyes will most likely burn the eyes even before it is lit.

After blinding your opponent the fire in his face will kill him; the flames that are most likely to kill are those that are breathed in. So saturate the face as much as possible with fuel, concentrating on the eyes, mouth, and nose. A mustache and beard on your target will increase the lethality of the weapon. A ski mask can have a similar effect, though it can probably be pulled off quickly.

If you are able to get enough fuel deployed, the chest is a good target, because flames burn up, where they will be breathed in. But if you can hit the chest you can probably hit the face too, and it's a better target.

The hands are good targets for any weapon, including this one. This is because the hands are what a person uses to affect the world around him; if his hands are injured seriously enough, he will be far less able to affect you; he can't grip a weapon, make a fist, or grip you. He can still do other things, like kick you or even slap you, but his main means of hurting you will be damaged or destroyed. Just make sure he can't grab you while his hands are burning.

Whether you attack the face or hands, keep the fire going once it has started by adding more fuel as fast as you can, until your opponent is no longer a threat.

If you spray his face with non-burning fuel it is likely that he will instinctively wipe it off with his hands right away, then wipe his hands on his clothes. Wherever the fuel is it will hurt him when it burns, but you will do well to keep spraying his face as he wipes it and his hands off, and spray his hands as he wipes his face off and when he instinctively puts them out in front to block the fuel you are spraying at him.

If your adversary has something to use as a shield it might be difficult for you to attack his face effectively, but you can probably still attack his hands, arms, and legs. Spray him all you can wherever you can. If the shield is a piece of cloth, like a shirt or towel, and you squirt it and then ignite it you might burn him, but he might be able to throw the burning rag and hit you in the face with it.

Another spray flame weapon is the old trick of filling your mouth with liquid fuel and blowing it onto the target. Light it either as or after you do this. Make sure the fuel you put in your mouth is not poisonous or caustic. Strong alcohol is very good for this; it needs to be at least 100 proof to burn at all and stronger to burn well. This is a single shot weapon that can be reloaded in a few seconds if you have a glass of fuel (i.e., strong drink) in your hand. It can come as a big surprise.

Of course if you have a glass of fuel in your hand, it is probably better to simply use it as is.

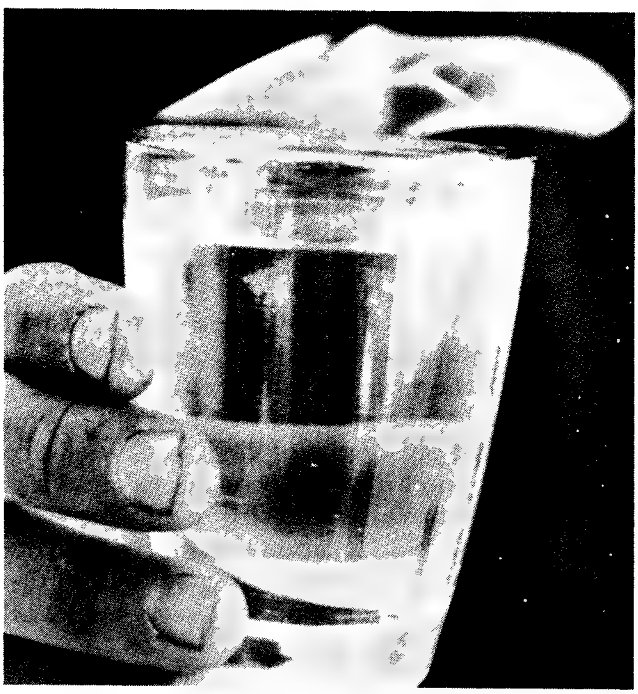
MANUAL DUMPERS I: HAND-HELD DEVICES

An open-topped vessel that can hold liquid can become a vehicle used to apply fuel to a target. The larger it is the more fuel it can hold and

so the more powerful it can be; the smaller it is the easier it is to carry and manipulate. The size of its opening and how well its design fits the hand affect how quickly it can dispense fuel, and so how efficient a flame weapon it is. Its power is proportional to its size. This section will cover vessels ranging in size from drinking glasses to buckets.

The size of opening determines how well the vessel can dispense fuel. Drinking glasses and buckets are designed to have their contents dispensed quickly and easily and so work very well in this regard. Bottles with small mouths are virtually worthless as dumpers, unless you have plenty of time. Vessels with handles on the side, such as mugs and pitchers, are relatively easy to use; a pitcher can be very powerful. Whatever vessel you choose, make sure there is nothing on it (such as an ice strainer on a pitcher) to inhibit quick and controlled dumping of its contents.

Wide-mouthed jars, of the type food is sold and preserved in, work well. These have the added advantage of a lid, that makes them easier and safer to carry, and contains the fumes of the fuel. Such jars might be carried as Molotov cocktails (covered above), but a situation develop that makes it better for them to be used as dumpers. Having this sort of option improves their value as weapons.



Have a drink, buddy; it's on you. A small glass of 180 proof alcohol is far less powerful than some dumpers with some fuels, but it can be enough to neutralize a threat, and in the right situation it can be more or less invisible. The fuel should be lit just before being thrown; the target is the mouth and nose area. Get as close as you can.

Mugs are better than glasses because of the handle on the side, and mugs with flip-top lids are better yet, because the lid contains fumes and reduces the likelihood of spills, and can be moved out of the way quickly and easily.

Any liquid fuel can be applied by this vehicle, from 180 proof alcohol to napalm. As with other flame weapons, fuel that is thick and sticky is generally best, though being too thick or sticky will make it hard to dump, and the thicker and stickier it is the more of it will stick to the vessel. For a complete discussion of good liquid fuels, see Chapter 2.

IGNITION

Ignition of the fuel can be either before or after the fuel is dumped on the target. If the fuel is ignited before it is thrown, only the top will burn until it is thrown, then all of it that is exposed to air will burn. This is generally the best way to employ this weapon. The fuel should be ignited just prior to being thrown, and the vessel, which will probably have some burning fuel on it, should be dropped.

If the fuel is not ignited before it is thrown, there will be some difficulty in getting it lit, because the one it has been dumped on will do his best to keep you from lighting it. With volatile fuel that will be giving off fumes that ignite easily he will most likely fail, if you can get close enough. But he might be able to drag you into the fire as his final act.

If you are under stress when you employ the device (which is a high probability), it is possible that you might spill some fuel on yourself as you dump it. In fact it is a virtual certainty that you will get some burning fuel on your hand, though probably not enough to get even a first degree burn if you wipe it off right away. Be careful that your opponent doesn't rush in and make you spill it all on yourself.

Liquid fuel, even highly flammable fuel, will render matches useless if enough of it gets on them or their striker before they are lit. Liquid

fuel poured on matches already burning will be more likely to extinguish the matches than take their fire. The match, as with any flame, needs to be applied to the fuel; the fuel should not be dumped on it, as perhaps in using an adversary's own lighter as an ignition source when he is lighting a cigarette. The flame being sucked into the cigarette would be somewhat shielded; if only a little liquid hits it or if only fumes hit it, the fuel will probably burn.

Since fire burns up, if the vessel is a bucket with a handle at the top and the handle is a necessary part of your ability to dump it, the fuel obviously has to be dumped before being lit. The same is true if you have to grip the top rim. Make sure the hand gripping the handle or rim is up and out of the way when the fuel is dumped even though the fuel isn't burning.

A good source of ignition for this weapon is a cigarette lighter; if the one you have is childproof, make sure you don't forget how to operate it when you are under stress. If it is adjustable, make the flame as big as you can.

Matches will work, but not as well, because they are not easy to light one-handed (see Chapter 4 for explanations of how to do this). With a big dumper like a pail the best way to use a book of matches might be to deliver the fuel, throw the bucket, and then use both hands to light the whole book and throw it in. This will keep you at a distance when the warhead deploys. A road flare can be used likewise, and a signal flare from an even greater distance.

If both hands are required to operate the dumper, the igniter needs to be held in one hand at the same time it manipulates the dumper, preferably lashed to the hand, or carried in a way that it can be accessed quickly and easily, or two or more firemen can work as a team, with one dispensing fuel and the other igniting it.

Candles, lamps, and torches will work if you have a free hand. With a candle you have to get in close if you don't light the fuel before you dispense it; the other two you can toss. A lamp or candle might be sitting on a dresser looking innocent, with no apparent connection to the fuel it is about to ignite. Spark-makers, such as empty cigarette lighters and torch strikers, might work if the fuel is very volatile, but will be very difficult and unreliable at best. A flare or flare gun will work very well.

WEAPON EMPLOYMENT

The essential maneuver in the employment of this weapon is getting into a position where you can throw the contents of the vessel onto a target, without being so close that the target can grab you and pull you into himself and the fire, or stab you or do whatever it is you are killing him to keep him from doing.

Like the spray dispensers covered above, this is not an especially good weapon. It is worth knowing how to use though, because sometime it might be the best weapon you can get, and if you are good enough, you can make it work. If you are otherwise unarmed or poorly armed and someone who is a better fighter than you or who is better armed than you is trying to kill you, a glass of fuel and ignition source will give you a fighting chance. You need to be able to outmaneuver your adversary as you throw the fuel, then stay away from him as he tries to grab you. Surprise will make this infinitely easier.

Unlike the spray dispenser, the fuel in this case is dispensed all at once. This makes it a single shot device, but the one shot is very powerful. There is also a difference in that this vessel has to be open to the air at some point, which increases danger and can give the enemy intelligence of your weapon through his sense of smell.

One way to employ this weapon is to hold a drink glass in one hand filled with the strongest alcohol you can find (100+ proof; preferably 190 proof). In your other hand you have a cigarette lighter, accompanied by a cigarette in your mouth that you are about to light. As you light the cigarette, set fire to the fuel and immediately throw it into the face of your adversary.

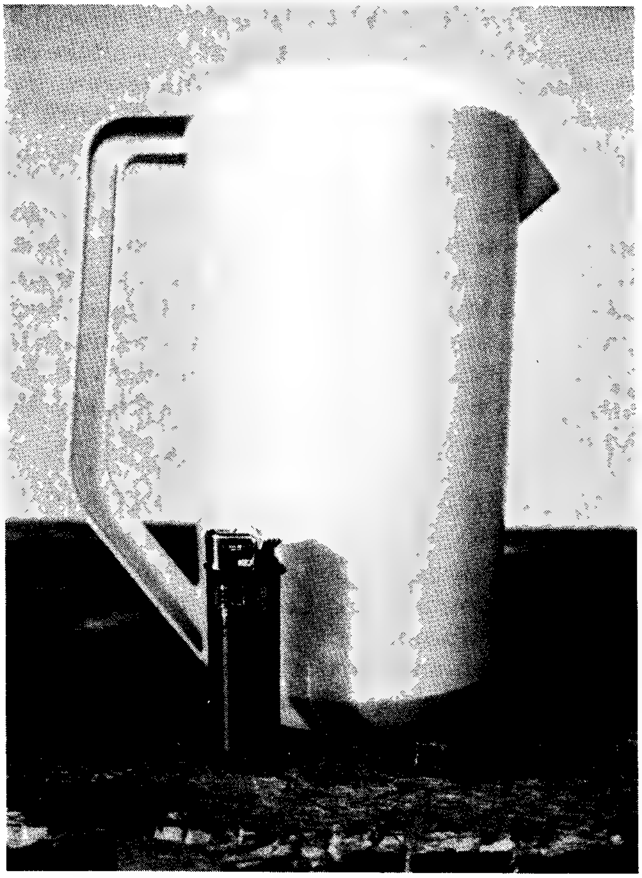
It is important to keep in mind that alcohol is not an especially good fuel. It has a high flash point (54 degrees F), below which it will be very difficult to ignite. So if you use this fuel, get the strongest alcohol you can get (100 proof will just barely burn), and use it in a warm environment.

This technique virtually requires that your adversary does not know that you are about to attack him. So it has little application to self defense, but might be of use in national defense, for instance, in making oneself invisible and killing an enemy.

The strong smell of strong alcohol might tip off your target; few people drink 190 proof alcohol out of a big glass. A vessel with a lid on it,

This mug makes an ideal dumper: it has fairly good capacity, a wide mouth, a handle on the side, and a cover to contain fumes, that can be opened quickly and easily with one hand.

Power is proportional to size; this is a magnum hand-dumper. The lid can be flipped off fairly easily. It has two openings that will let some fumes out if they are not sealed.



Compared to a mug, a pitcher is a cannon. This is a good one: it's big, it has a good handle on the side, and it has a lid that can be removed fairly easily. With a dumper of this size, target the upper chest and face. Use the best fuel you can get, but don't carry solvents in plastic without testing to see if the plastic will melt.

such as a covered mug, can solve this problem, and the top can usually be flipped up pretty quickly and easily. In a room where there is a lot of smoke and alcohol though, alcohol fumes probably won't be noticed much.

Don't put ice cubes in alcohol to disguise it: alcohol absorbs water like a sponge, and burns less well the more water it absorbs. It will even absorb humidity from the air.

Gasoline will work far better in this regard than alcohol, since it will light easier and burn better. Gasoline mixed with oil, including vegetable oil, will work even better. Even a small amount of gasoline will get the oil burning; the oil will not take fire easily with no gasoline. Even a small amount of gasoline will give off a very strong smell, so it needs to be in a covered vessel (i.e., mug with a flip up lid); things like strong perfume and cigarette smoke can be used to mask the smell.

A larger vessel, such as a pitcher or bucket, can be used in the same way, though with much greater effect. The pitcher has the advantage that it can be emptied with one hand, and the hand is beside the vessel, not above it. A pitcher with a wide open top is a powerful weapon. Many pitchers have lids, that are easy to remove.

To surprise an adversary with a bucket of fuel, as in an assassination, you might pretend to be a workman cleaning a wall with solvent or carrying something in a covered bucket. Or you might be just waiting around a corner.You might be on a level above your opponent, and be out of his realm of awareness as you pour burning fuel on him; this can be from a balcony, window, down a staircase or through a grating.

TARGETS

As with spray fuel, the most vital area should be targeted with this weapon, and that area is the face, where flames will blind your adversary and be sucked into his lungs as he tries to breathe. With small dumpers the face is targeted by throwing the fuel directly on it. Beards and stocking masks soak up fuel and increase the performance of the weapon, though a burning mask might be pulled off quickly. Masks made of cotton or plastic (i.e. polyester, nylon, etc.) will add themselves to the fuel load; wool burns poorly.

Targeting the face is not always easy or possible. Fuel poured from above, for example, will only get on the target's face if the target has his face turned upward when it hits; if he looks up far enough from the time the fuel hits him, he will be able to avoid the weapon completely.

Any time you attack the face directly with this weapon your enemy's face has to be turned toward you, which means he is able to see you. He will reflexively put his hands out in front of himself if he has time; this will deflect some or all of the fuel away from his face, which might save his life, though his hands and arms might be burned badly enough that he will no longer be a threat, and if necessary you can finish him off by other means, unless he has comrades close by. With larger dumpers, the chest, head, and neck

should be targeted. Fire will attack the face because it burns up, and targeting the head only will probably cause some or much of the fuel to go past your adversary as you throw it. Heavy, absorbent clothing, especially around the head, neck, and chest, help to retain fuel. With a bucket-size dumper, most of its fuel getting on your adversary anywhere will probably incapacitate him at least, but it will be certain to do so if you attack his face, by way of the chest.

The hands are also good targets, but since you only have one shot they are not a good target to aim for. If you throw fuel onto a person's face though he will most likely instinctively put his hands out as shields between his face and the dumper, if he has time. That means they will be targeted without any effort to do so on your part.

A hand gripping a gun might be a good target, if you can hit it without getting shot, but the face of an adversary armed with a gun is obviously a much better target, because it will blind him immediately and kill him quickly. If you dump fuel on an adversary armed with a firearm, including his gun hand and the muzzle, there is a good chance that the muzzle flash will ignite the fuel if he fires his weapon (excuse the pun). He might not be aware of this though, or not care, and shoot you anyway.

Bucket-size dumpers can be used to attack multiple persons, by soaking a close group. Since it is next to impossible to control the amount of fuel on each individual and where it hits, the weapon used in this way will be less likely to be certain of incapacitating any of the group than a smaller dumper used against an individual. But it should at least give you a good opening, to be followed up with other methods.

This dumper can also be used to attack multiple targets by being used to set fire to a building. The second biggest mass murder in U.S. history was committed by a psycho (one of Jimmy Carter's Cuban boat people) who set fire to a night club using around a gallon of gasoline. For more on this method of employment, see previous item, "The Technique of Systematic Arson."

This weapon can also be used to attack one or more people in a vehicle, by throwing fuel through an open or broken window. Unless you have quite a bit of fuel, throwing it on the outside of a vehicle will probably have little effect, except to blind the driver if you throw sticky fuel on the windshield. A lot of fire should drive the occupants out of a car by its heat and smoke or by scaring them, and it can kill the engine, by consuming its air and ruining electrical parts. It can do this much better if it can get on the engine and into air-intake vents.

Armored vehicles can also be attacked with this weapon, in the same way they are attacked with a Molotov cocktail. Being dumped from above would be easiest. If a hatch is open and you can get fuel inside, the armor is irrelevant. If you can get close enough to an armored vehicle to employ this weapon, you might be able to wait for a hatch to open as well.

MANUAL DUMPERS II: DRUMS

Fuel can be applied to a target with large open-topped vessels that can be dumped, such as fifty-five gallon drums. The differences between these and smaller dumpers are that these are far more powerful than, and can not be carried or manipulated as easily, as their smaller counterparts. For these reasons, big dumpers are better suited to the attack of groups than of individuals. Their employment is more strategic than tactical. The amount of fuel contained in them is comparable to the amount of fuel contained in some incendiary bombs dropped from airplanes; with these though fuel can be applied far more precisely.

Drums can not usually be moved without being tipped. So if a drum needs to be filled in one place and carried to another, which is likely, a well-fitting lid that can be locked in place is very important, unless the drum is only partially filled. Even in that case, an open drum will give off a lot of fumes, which are dangerous to breathe and a premature fire-hazard; they also telegraph your intentions.

Drums can often be found in industrial areas, sometimes already filled with fuel and labeled for easy identification. When the contents are not flammable they can be dumped, and the drum refilled with fuel; industrial sites always have fuel tanks somewhere, even if only the ones on motor vehicles. Try not to make a mess when you dump the original contents; look for a big floor drain.

Thickening agents such as oil are likewise usually available in such areas. Thickened fuel that will burn more slowly than pure gasoline is the best to use with this delivery system. A mix

of half gasoline and half motor oil is probably the best. For more on thickened fuel see the subhead "Napalm" in Chapter 2.

Things like pulverized coal and sawdust can be added in to extend burn time, or just to finish filling the drum if you don't have enough liquid fuel to fill it. They will tend to settle to the bottom and not go far when the drum is dumped, but they will concentrate fire at that point, which might be an escape route.

How thick you want the fuel to be depends on how concentrated you want it to be when you dump it; thinner fuel will spread further. The thicker and stickier the fuel is the more of it will stay stuck to the drum; this should not be a problem though with a fifty-five gallon drum, unless the fuel is real thick and sticky.

Very often steel drums found lying around industrial areas have holes in them, so if you find an empty drum, inspect it closely before you fill it.

Drums in industrial areas can have a few different kinds of lids. In order for a lid to make a seal to completely contain liquid in the drum, it has to have a gasket around the part that fits over the rim; this should be inspected. A few cracks won't ruin it for this purpose, but it should be mostly intact.

By far the best lid for this purpose is the type that uses a band surrounding the top rim, which locks and unlocks with a lever. This type of lid lock is very secure, and can be opened quickly by someone who knows how. Usually a screwdriver or some other pry bar is necessary to pry open the lever.

Some drums, especially older ones, use lids with locking tabs that fold down or up to lock or unlock the lid. This type of lid can be plenty secure, but takes some skill to be set for quick opening. If used for this weapon, only a few tabs need to be folded down, opposite each other. A screwdriver or other pry bar is useful in prying up the tabs.

A garbage can or similar container might be able to be used for this weapon. Lids on garbage cans rarely fit well, and can not be locked in place. But they can be engineered to work adequately if the right materials are available. For example, on a square trash can, place several large plastic trash bags between the top rim and the lid as a gasket. To lock the lid down, wrap wire around the can from the bottom to the top (the wire needs to be set under the can before the can is filled), twist the wire tight, and it should seal the can. The lid can be opened quickly and easily by cutting the wire with wire-cutters.

IGNITION

When delivered by this mechanism, fuel will most likely be spilled first and then lit.

The best igniter is one that can be tossed into it, such as a book of matches that can be lit, or a match head igniter, preferably with things added to extend burn time. A Molotov cocktail or other incendiary grenade can be thrown in from a distance. A flare can be thrown or shot in. Since ignition is essential to weapon function, multiple igniters should be carried.

Keep in mind as you light the fuel that a drum carries a big volume; when it spills and gets lit there will very quickly be a big hot fire. Depending on the volatility of the fuel, it can burn so suddenly it explodes, or it can burn more slowly. Fuel as volatile as gasoline will probably explode. Even with less volatile fuel, you want to be well away from it or behind a barrier when you light it. Dump it through a doorway and stand beside the doorway when you initiate fire.

A flare or Molotov cocktail will allow you to start a fire from a distance after you have dumped fuel. The matchbook igniter with added matches can be tossed several feet, which means it can be thrown through a doorway, with you standing to the side.

WEAPON EMPLOYMENT

In some cases a drum might not need to be moved after being filled. For example, a trash can might be set at the top of a staircase, and filled with fuel one bucket at a time. This will work if the location of the targets can be known beforehand. You might, for instance, know that a group of enemies will attack you by coming up a staircase. Or you might know that the upstairs will be filled with enemies at some future point in time, so you set a disguised fuel drum at the best place to spill fuel for a fast and furious fire, namely at the top of the stairs. Keep in mind if you ever do this that the entire area above and below the dumped fuel will be quickly engulfed in smoke and flame, so you had better have a very good escape plan.

In most cases a drum will be filled at one location and carried to another before being employed. There are a few ways this can be done. Often where there are drums, there can also be found the means to move them.

One way is with a two-wheeled hand cart. Some of these are designed to carry heavy furniture and appliances, some are designed to carry drums; either will work. Since fifty-five gallon drums filled with fuel are big and heavy, a big, heavy-duty hand cart should be used to move them. These hand carts usually have a means to secure the thing being carried; this apparatus should definitely be used, and if there is not one on the cart one should be improvised. The cart is then tipped over along with the drum.

If you need to save the cart, you have to take the time to open your rigging and pull the cart out from under the drum before you dump it. This is a difficult thing to do in a big hurry.

One to several drums can be carried on a pallet carried by a forklift. Any reasonably competent person can figure out how to drive a forklift in a few minutes, if he doesn't already know. There is always a lever on a forklift that tilts the forks forward; they might not tip forward far enough to dump the fuel, but they will at least make dumping easy. Spacers can be set under one edge of the can so that the tilt of the forks alone will be enough to tip the cans over. Be sure to set spacers so as to aim cans in the direction you want them to tip. Use a pallet that does not have any boards under the rails, and tip the drums by tipping the pallet. Two or more people working as a team can make this work very well.

Drums can be loaded and unloaded easily into and out of truck beds using what is called a Tommy-Lift. This is a tailgate that rotates down until it's level with the truck bed, then moves down and up like an elevator. These can be found in some industrial areas, at places that supply industrial gasses, and they can be rented.

A big, heavy drum filled with liquid is not an easy thing to tip over. A tall hand cart tied at the bottom to the drum will make tipping easier by acting as a lever. A drum set in place to wait for an enemy can have spacers set under one edge of it so that it is almost ready to tip and only takes a little push. Or a drum can be set on a long, strong board, that when picked up acts as a lever to tip the drum.

No matter how you tip over the drum, if it is full or almost full, be careful that you don't let it rock back and forth, sloshing some of the fuel out on yourself.

A drum filled with fuel carried on a two-wheeled hand cart might be employed in a number of ways. For example, a soldier behind enemy lines might carry the weapon to a building known to be filled with enemies. He might disguise himself by dressing like a workman, perhaps delivering supplies to a big kitchen, or he might dress as a clown, with the drum painted like a prop for a clown act; around Christmas he might dress as Santa Claus, with the sealed drum apparently carrying gifts. There are many possibilities; the one chosen needs to be custom fitted to the target.

As always, the soldier in this case should deliver his incendiary bomb as close as possible to his enemy's heart. He might not be able to do any better than get it just inside an exterior door before spilling and lighting it, but that might be close enough to the enemy's heart to accomplish the mission. A soldier might be able to wheel a drum into a building and dump it into a room or staircase full of enemies, killing all of them. Or he might carry it inside to set fire where it will grow the hottest and fastest. Anyone who carries fuel into a building and sets fire to it obviously needs to make sure he has a way out, unless it is a suicide attack.

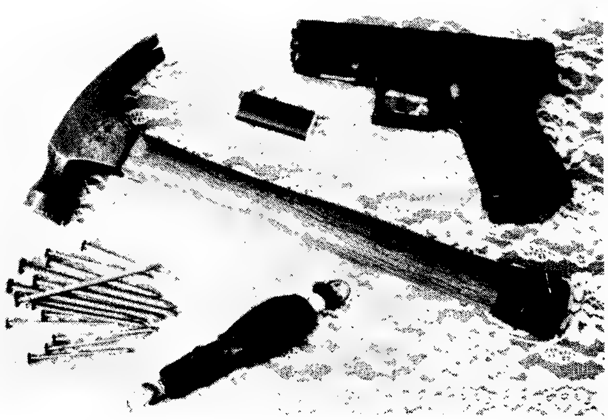
A crew of firemen can work together on a mission of this kind. Multiple drums can be dumped simultaneously, each from a different point, so that multiple fires burn in different parts of the building at the same time, trapping the

occupants inside and killing them before they can be rescued. How many drums should be dumped depends on the size of the building, number of escape routes, and other factors.

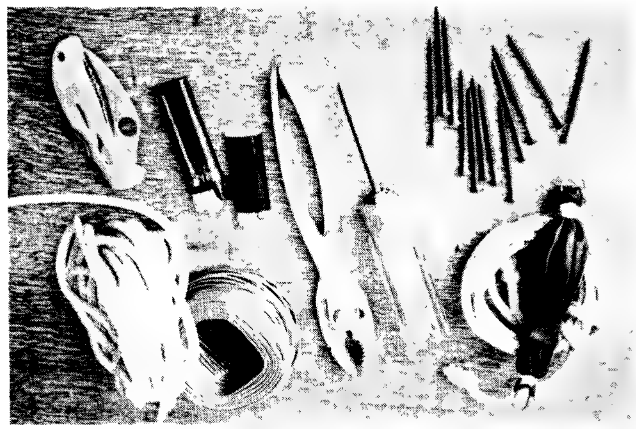
The fireman carrying a drum can be assisted in a number of ways. A few assistants might go into the building beforehand and open fire doors and disable sprinkler systems. Assistants that appear to have no connection to the guy with the drum can be walking alongside or pre-positioned to neutralize anyone who shows too much interest. All who are in the target area obviously need to be able to get out, preferably before the fire starts; coordination and timing are critical.

Outside operatives might nail or wire escape doors shut or hit escape routes with Molotov cocktails. Others might block, damage, or destroy bridges and roads, break open numerous fire hydrants away from the fire to lower water pressure, and hinder fire-fighting efforts in other ways. Or they might instead simply start more fires.

A crew can deliver several drums of fuel to a building in the back of a van or truck. The fuel can be deployed quickly if each drum is already connected to a hand cart and there is a good man for each cart. Unless delivery is made to a loading dock or there is a crane or forklift, a Tommy Lift or ramp is necessary.



To maximize enemy casualties, close off escape routes. This can sometimes be done with a hammer and nails; a hammer with a straight claw is best. The hammer can also break into buildings, make openings for air passage, rip boards apart, and kill with less noise than a gun (the gun makes a good back-up). Hammering nails isn't very quiet though.



A tool kit for shutting off escape routes quietly. This kit is much more versatile than a hammer and nails: tie wire, rope, and drywall screws and a screwdriver can put temporary locks on many exits. A power screwdriver is a lot faster, but also makes more noise; like a hammer, a screwdriver is a very effective silent weapon. Fire and incendiary boobytraps can also shut off exits.

In theory, a large enough crew can deliver sufficient fuel to start mass fires like the ones from incendiary air raids. Such a crew would have to be very large though; tons of fuel were dropped in these raids. There should be enough confusion after such a raid to make escape relatively easy. After the fire has started, no one has to be carrying anything that might identify him as a soldier. All operatives would need to be sure they didn't smell like fuel.

A fuel drum can also be employed successfully outside of a building, especially where there is some sort of confinement. For example, a group of enemies engaging in a demonstration will often be in a fairly tight group; these demonstrations are fairly common in totalitarian regimes and other places where people think what they are told to think and love to show their enthusiastic hatred for the enemies of those who enslave them. Given the right conditions, such a group is a valid target. Armed police or soldiers are usually stationed around such demonstrations; these make delivery and escape difficult and dangerous.

If such a group enters a semi-enclosed space, such as a corridor between close buildings or a walled courtyard, it is vulnerable to attack by fuel drum. It is best to deliver fuel from two or more

points, those points being the most likely directions of escape. Fuel would most likely be carried to the demonstration by one or more motor vehicles such as pickup trucks, or be dumped from the top of a building or window, or pre-positioned somewhere else. Fuel dumped from buildings needs to be dumped outward far enough that it isn't wasted by getting on the side of the building on the way down.

Even in the wide open, fifty-five gallons of good fuel dumped into a crowd will kill and injure quite a few people.

If there are many drums of flammable liquid, not all of them need to be opened and spilled. Intense heat will cause the fuel to expand until it bursts the can forcefully; this pressure explosion mixes vaporized fuel with air and fire very suddenly, typically causing another explosion. Nonflammable liquids in tight containers will burst powerfully when heated but the contents will not explode; they might be toxic, and add to the lethal power of the weapon. They might also put the fire out, though probably not.

Some drums not opened might be opened a little by being shot into with bullets or cut with axes. This might spark and ignite the fuel, but is not likely to, unless the fuel is shock sensitive or incendiary bullets are used. It would be a very good idea though to stand far away whenever shooting into any supply of fuel. If drums are stacked, holes are best put in the lower ones. At least two holes per drum are necessary, with one at or close to the top; the level of the lower hole determines how far down the drum can drain.

Drums dropped from the top of a tall building or an upper-story window don't need to be opened before being dropped, because they will burst and spread their fuel when they land. If you do this make sure they fall at least a few stories. If they hit people instead of pavement, the people hit will most likely be killed or seriously injured, but will also break the fall somewhat, reducing the size of area covered by fuel. Adjust the height of the drop point accordingly. Sealed fuel drums used in this way might contain chemical fire initiators, or fire can be initiated by Molotov cocktails or flares.

Getting big drums that weigh a quarter-ton to the top of a building will require expertise in engineering and rigging, since few elevators go up beyond the top floor. The tops of most buildings have a wall around the edge, which will make it very difficult to dump or roll drums off. If a ramp and platform is built, drums can be positioned where they can be pushed off easily, but this takes a considerable amount of work, and once the drums are in a position where they can be dumped, they are also in a position where they can be seen from the ground.

Dumping drums out through upper story windows is easier, if the windows are big enough. A ramp and platform will usually be necessary to get the drum level with the window. This might be made from a desk and a door removed from its hinges (make sure the door is solid). Once in position, the drum or drums are not visible from below.

By far the easiest way to deliver fuel by drum though is to simply leave the drum or drums on the ground in the first place and tip them over. The end result will be essentially the same. The advantage of dumping them from buildings is that they might be easier to hide.

Chapter Six
Timers, Boobytraps and Remotes

It is often a very good idea for a fireman to be somewhere else when his fire starts. Moving away from a building without being noticed is a lot easier when the building is not burning and there are no loud noises behind you. With fuel/air mixes, such as flammable gasses and volatile liquids, it is very likely that when fire starts there will be an explosion; with so many variables, the behavior of fire in such fuels is hard to predict. So a smart fireman will be far away when fire in such a mix is initiated. Other fuel/oxygen mixes, such as charcoal powder, sulfur, and the oxidizer potassium nitrate, are easier to predict, and you definitely don't want to be in range when fire starts in them.

There are three ways to set a fire that will begin after you have left an area: timers, boobytraps, and remote triggers. Timers are devices that allow you to delay the initiation of fire, for anywhere from seconds to seasons. Boobytraps have the same effect, by causing a fire to be initiated by the action of an unwitting person, preferably after you are long gone. Remote triggers allow you to initiate fire yourself, from a distance, by direct action.

There are many ways for devices of this type to be made. A few examples will be given in this book.

TIMERS

A timer is a device that will delay ignition for from a few seconds to days, weeks, or even longer. Usually the delay is minutes or hours, long enough for the fireman to get safely away, and perhaps also for him to establish an alibi. It is important to keep in mind though that a good fire investigator will probably be able to figure out that a timer was used, unless all evidence of it is burned up and the ashes are stirred.

Timers are typically placed at the point where the fire originates. Since fire burns up, the timer is burned but not destroyed. If a timer is made of all flammable material, and is set well above the origin of the fire, there will be little or no evidence of it if the fire is hot enough to turn it to dust and something (i.e., firefighters) stirs the dust. Even then, it would be better if the timer was made of material that had a reason to be there.

If you want to avoid the suspicion of arson avoid also explosions. Have the fire start where one might start accidentally.

FUSE

A fuse is a string of solid fuel mixed with an oxidizing agent, that is used to delay ignition, and carry fire from one medium and one place to another. The fuses of grenades and firecrackers, for example, give the user time to activate the device and then put distance or shielding between it and himself. A similar fuse will be used by the arsonist, in igniting things like thermite. A longer fuse can allow him to get out of a building before his fire begins.

A fuse is not tinder, it is simply an ignition, albeit a very good one. In order to start fire it needs to be brought into contact with something that will take fire from it. This can be a book of matches with the heads touching it, a fuel/oxidizer mix such as black or smokeless powder, or

a fuel/air mix such as a cloud of flammable gas or the vapor of volatile liquid. A fuse can also be taped with matches to the ignition end of a road flare; tape the fuse securely to the flare, and tape the matches over it, where the fire from the fuse will reach the match heads, and their fire will reach the flare-igniter.

A fuse can be used to ignite gas or the fumes of liquid fuel, but in order for it to provide a time-delay, at least some of the fuse has to be kept out of the atmosphere containing the fuel. One way to do this is to run the fuse through a hole in a wall or window, and seal the hole with caulking; turn the gas on inside, and light the fuse from the outside. If you're not sure that there will be a good air/fuel mix at all levels of the chamber the fuse will run into, hang the end of the fuse from the ceiling, and set it so that it burns from the floor up; in that way fire will reach all levels.

The action of burning will make a fuse jump around. This might make it pull loose from the fuel it is to ignite. So it should be secured against this in some way. If it is stuck deep enough into a big enough pile of powder, the powder will hold it in place. In some cases it should be taped to something.

If you intend to use a fuse as a timer for more than several seconds, keep in mind that it will give off smoke and a strong smell, which is recognizable as the smell of burning gunpowder.

To light a flare reliably with a fuse, tape the fuse securely to the igniter end of the flare, then tape matches around the same end, so that their fire will definitely reach the igniter. The flare and fuse are waterproof but the matches aren't. They can be waterproofed with a balloon if necessary, by adapting the instructions for making a waterproof fuse lighter in Chapter 4.

To make a fuse better able to transfer its hot but short-lived fire to the next medium, attach something to it that will take its fire and expand it. This can be matches, black powder, smokeless powder, thermite initiator, or other highly-flammable powders, piled on the fuse or put into something like a plastic bag. Make sure the fuse extends well into the powder, and is secured so that it can't be pulled out of it. If it is not secured, it will jump around as it burns.

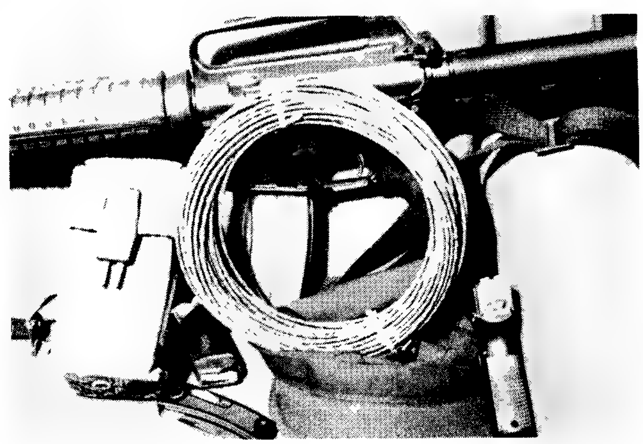
Don't use a fuse to light flammable gas or liquid unless the fuel is contained, otherwise the fuse will probably light it earlier than you expect.

FACTORY-MADE FUSE

Fuse made in a factory, often called cannon fuse, should be available anywhere black powder supplies are sold. Coming in long rolls and sold by the foot, commercial fuse is usually well made and waterproof. Testing one section of it will show you how fast the rest of it will burn.

Short fuses can be cannibalized from many fireworks (along with the fuel inside). The bigger, more expensive fireworks will have the better fuses. Pull the fuse out carefully.

Factory-made fuse is usually pretty easy to light. To make one easier to light, fray the end to be lit. To simplify lighting further, set the fuse between the two rows of match heads of a match book, so that when the matches are lit, they will light the fuse. To make it even easier, tape a matchbook igniter to it (see Chapter 4), so that you only need to pull the tab.



This hundred foot roll of cannon fuse burns at a rate of half a minute per foot. It can be used uncut for a delay of roughly fifty minutes, or cut into shorter lengths.

Military fuse is heavier-duty than commercial fuse, and is harder to light. It tends to burn a little slower.

The burning rate of fuse varies. It should be given on the package the fuse comes in, but keep in mind that the given rate is approximate. If timing is critical, test any type of fuse you intend to use, in an atmosphere similar to the one in which it will be used.

IMPROVISED FUSE

Improvised fuse can be made with potassium chlorate (or potassium nitrate), sugar, and cotton string (i.e., shoe string). First wash the string with soap and water. Then dissolve equal parts of the two components in an equal volume of hot water. Soak the string for at least five minutes. Then take it out, twist or braid three strands together, and hang it up to dry.

A fuse can be made in a similar manner with black powder. Braid three strands of cotton string together. Moisten black powder until it becomes a paste. Then work the paste into the braided strings with your fingers. Hang the string and allow it to dry.

An easier way to make improvised fuse is to fill the sticky side of a piece of tape with smokeless powder out of firearm ammunition (or some other flammable powder). Pour the powder into a pile, and push the sticky side of the tape down into it. Make sure the tape gets every bit of powder on it that it can hold. Do this by massaging the tape down into the powder until you can see and feel the grains of powder through the back side of it. Inspect the loaded side to make sure you didn't miss anything.

Plastic electrical tape holds together well and makes a good fuse. Transparent plastic tape made for paper doesn't hold together as well, but still makes a good fuse as long as it is supported as it burns, for example by lying on a table or floor. Test any tape you intend to use with gunpowder on it to see how well and how fast it burns.

Keep in mind that with a fuse of this type the intensity of the ignition can affect how fast the fuse burns; it might burn very fast, or it might just spark a few times and go out. Things like whether it is vertical or horizontal can also affect burn rate. So test any section of fuse under conditions identical to those in which it will be used to know how fast the fuse will burn.

Unlike factory-made fuses, these are not waterproof. They are also more fragile. When making improvised fuse, don't fall into the trap of thinking improvised means half-assed: inspect every part of it and make sure it's done right.

Another improvised fuse is made by pouring a line of gunpowder or other flammable powder on the ground and lighting it. The same thing is often done with liquid fuel. In the latter case there isn't usually much in the way of delay, depending on fuel volatility, so the fuse is more of a remote than a timer.

A piece of electrical tape with its sticky side covered with gunpowder makes an adequate fuse for some purposes. The pile of powder at the end will expand its fire, and carry it to the next medium.

The improvised tape fuse burns well.

CIGARETTES

A cigarette can act as a compact, slow fuse. Compact bundles of twenty are commonly available, for the price of a pack of cigarettes. As

testimony to the power of this device as a fire-starter, it is the leading cause of accidental fires in America year after year.

It is apparently possible to make cigarettes that go out when they are not being puffed every so often, but such cigarettes are not made. Since fire burns up, the cigarette should be set at a slight angle to burn upward, to be sure it doesn't go out. Make sure the cigarette is burning good and not just barely lit when you set it.

This fuse gives a delay time in the five minute range, depending on the angle it is set at, type of cigarette, and other factors. If timing is critical, test a cigarette out of the same pack at the same angle in the same atmosphere.

As a cigarette burns it gives off smoke (that of course is its purpose). If one is used as a timer some place where no one is supposed to be, or in a no-smoking area, the strong smell of cigarette smoke might cause someone to come and investigate.

To start a slow, smoldering fire, a cigarette and lighter might be your entire incendiary device. For a big fire at the end of the fuse you need to add tinder to expand the cigarette heat and transfer fire to the next medium. As is often the case, a matchbook is among the best such tinders, with the cigarette simply wedged between the two rows. A pile of flammable powder poured over the end of the burning part of the cigarette (the filter does not burn) will also take and expand fire.

Cigarettes often cause accidental fires by being left lying on upholstery; some upholstery and stuffing burns better than others. According to *Fire Protection Handbook*: "Smoldering of upholstered items, which is the typical consequence of exposure to a burning cigarette, can produce enough smoke and toxic gasses to incapacitate and kill persons not only in the room of origin but also in some cases those who are remote from the fire. Transition from smoldering to flaming does not occur in all cases; when it does, times from placement of the cigarette to flaming of twenty minutes to several hours have been reported. In a closed room, flaming can revert to smoldering when the oxygen supply is exhausted. With sufficient oxygen, a single upholstered item of sufficient burning rate can lead to room flashover." (Section 3, Chapter 11; pg. 3-123; 1991)

A cigarette is more likely to get upholstery burning if it falls or is fit into a crevice. Covering one with a piece of cloth such as a pillow or blanket also increases the likelihood of ignition. Medium and heavy plastic upholstery, such as nylon, olefin, and polyester, will probably not take fire from a cigarette. Wool is also very resistant. Other fibers, such as cotton, hemp, linen, and rayon probably will take fire from a cigarette. Blends are more resistant or less so depending on the blend ratio.

Some furniture has a tag on it telling what it is upholstered with; beyond that, get to know types of upholstery by sight and touch to master this weapon.

Since the fire starts slowly and smolders, it is relatively safe to hang around and make sure the cigarette will work. Be sure that not only the cover but also the stuffing will smolder or burn. Smoke detectors would have to be disabled.

Cigarettes start more fires than any other incendiary device. A cigarette sandwiched between match heads makes a good timer for a fire that will start more suddenly. The cigarette provides roughly five minutes of delay. Test a cigarette out of the same pack to be sure it won't go out, and make sure it's going good before you leave. Make sure its fire will reach match heads, not match sticks, and set it under fuel that will take its fire.

MATCHBOOK IGNITER/LEAKING VESSEL/FALLING WEIGHT

A matchbook igniter is an easy-to-make, easy-to-get, reliable source of ignition. There are a number of ways it can be used together with a timer mechanism. The one given here is easy to

improvise with common materials. For instructions on how to make a matchbook igniter, see Chapter 4.

This igniter consists of two components: matches and their striker. It is activated by the two components being pulled apart. One way to insure reliable ignition is to secure one component against movement, then secure the other component to a weight that will fall, pulling the two apart. There are a number of ways this can be done; one will be given in detail.

This timer is reliable if it is made right. It is not as precise as some other timers, but it is easy to get the material to make it and put it together quickly, and it will allow you time to get out of and away from a building long before ignition.

For this timer you need a matchbook igniter, a weight, such as a brick, several feet or more of string or cord, tape, a ledge, such as a table edge, for the weight to be balanced over, and a liquid-filled vessel with a leak toward the bottom. The best vessel is a plastic jug, such as a gallon milk jug. You also need the means to secure the igniter to the weight and an anchor; this can be a nail, tape, cord, or something else.

Prepare the jug by making sure the inside is perfectly clean. Anything inside might plug the tiny hole and cause the device to fail. You can make the hole before you build the trap so that you can test it, or the hole can be the last thing you make before you leave. In either case, make the hole at or a tiny bit above or below the point the side meets the bottom. If the hole is on the bottom make sure you set the jug on a block or ledge so that the hole will drain.

To increase reliability with a tiny hole, use the point of your blade to pull the plastic that you pushed in back out, so that water pressure doesn't push them together. Be careful not to expand the hole more than you want. If the hole does accidentally get too big, a piece of water-resistant tape, such as electrical tape, can be used to reduce its size.

If you want the timer to be in the half hour range, don't make the hole more than a tiny bit bigger than a slit, a sixteenth- to an eighth-inch in length. If you just want less delay, push the blade in correspondingly further. The size of this slit, how much you open it up, and how you set the weight will determine how long a delay the device will provide. If there is time, test the device to see how long it takes it to drain. Test it a few times if you can.

The more mass there is pushing the liquid down through the hole the faster it will drain; the inverse is likewise true. So as the jug drains its rate of drain slows down. This means you can't accurately estimate how fast the jug will drain by measuring and timing a small sample of flow, unless you are very good at math.

Once the jug is filled with liquid it will leak. The leak can be greatly slowed by leaving a good-fitting cap tight on the jug, and stopped by placing tape over the hole. If liquid is available at the site of the fire the jug can be carried there empty. Plastic jugs filled with liquid are common, so the whole thing might be quickly improvised on site; timing without a test will be imprecise, but should be precise enough to get you safely away.

The liquid in the jug must be thin enough to flow out of the hole you make. It must be free of particles that might plug the hole.

Depending on how long a cord you have to connect the brick to the striker, the leaking jug can be close to the igniter it triggers or far away from it. If the jug is filled with water, it must be placed where the leaking water won't ruin your igniter; it's just as well not to contaminate fuel either, though the water will run down and the fire will burn up. Set the jug in a sink or floor drain if the cord to the weight will reach one, but don't go to a lot of trouble to do it.

If the jug is filled with fuel (i.e., gasoline), it still must be set in such a way that the liquid will not make the match heads wet. With a slow leak, much of the fuel will be vaporized when ignition occurs, probably resulting in an explosion. A gas line might be opened as well, just before leaving, adding to the effect.

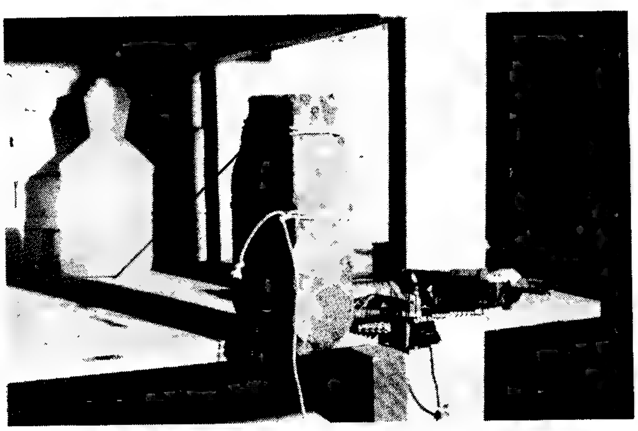
If there are people in the area of a leaking jug of fuel, there is a good chance they will smell fumes, and perhaps evacuate the building or disable the device before it fires. In such a case a bigger hole for a faster release time would probably be better than a tiny hole. With less time for vaporization, there would be less chance of explosion, which might be better or worse, depending on your intent.

Secure the matchbook to a point under the solid fuel you intend for it to ignite, or over it or in it if the fuel is liquid or gas. Tie a cord to the striker, and tie the other end of the cord to the

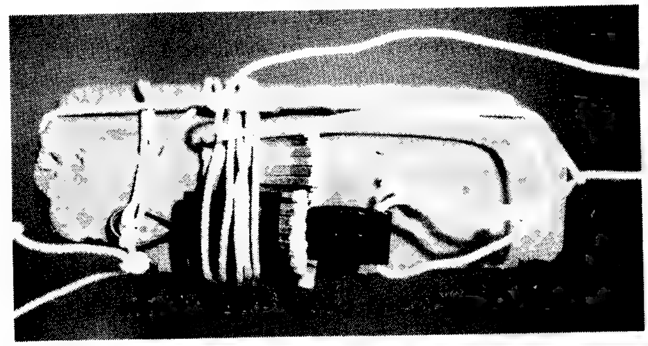
brick, in such a way that when the brick falls it pulls the striker. Keep in mind that once you do this dropping the weight will activate the device. Make sure there is sufficient weight to do so, and that the striker will be pulled more or less straight out.

Alternatively, the matchbook can be the component of the igniter that is secured to the falling weight. This might be done if the fuel is a room full of a mix of flammable gas and air, for example. The mix of fuel and air might not necessarily be within the flammable limit at all points in the room. If you attach the matchbook to the falling weight, it will bring fire to all levels of the room as it falls. This will increase reliability.

Secure a second cord to the top of the weight. Set the weight on the ledge so that its center of gravity is well over the edge, so that if it is not supported it will fall. Set the jug on the other end of the cord, so that its weight holds it and the brick in place. Make sure the brick is far enough over the edge that when the jug loses its weight by being drained, the brick will definitely fall.



The plastic jug has a tiny hole in the bottom edge, letting thin liquid drain slowly out. A nylon cord that it sits on holds a brick suspended over the edge of a shelf. A second cord connects the brick to a matchbook igniter.When enough liquid has drained, the brick will fall and pull the striker. A row of matches taped to the upright and fire-starting logs stacked behind it will get a good fire going. If the liquid in the vessel is flammable and volatile, the fire-starting logs are probably superfluous. The lid is removed from the jug just before leaving.



A matchbook igniter tied to a falling brick will bring fire to all levels of a chamber as it falls; it is a good igniter to use with gas, where a flammable mix of air and fuel might not exist at all levels. Extra matches increase power and burn time; many more can easily be added (theyíre cheap). The weight can be released by a timer, boobytrap, or remote.

Just before you leave the area, remove tape or anything else used to stop the leak (make sure the sticky part of the tape hasn't plugged the hole), or make the hole very carefully if you haven't yet, and take the top off the jug. If you leave the top on, the jug will probably drain for awhile, but when the pressure equalizes it will stop, or slow down immensely.

CANDLES

A candle will take a certain amount of time to burn to a lower level, and that amount of time can be measured. So they have long been used as timers, for many purposes. They can also provide their own ignition.

The problem in using a candle as a source of ignition as well as a timer is in bringing the fire to the fuel. A standing candle will burn straight down, so it is mechanically difficult to set fuel that the flame will reach. In addition, a candle not labeled dripless will often melt into a pool of wax, because not all of the wax burns. The wax is flammable, but the candle flame is not big or hot enough to burn all that it melts.

How much of the wax burns depends on the type of wax, shape of the candle, and whether there is something to contain the melted wax so that it stays in a pool instead of running to where the wick cannot reach it. There will be less unburned wax from beeswax candles, but probably still some.

Sometimes a candle left burning starts an accidental fire, so a candle set in a traditional manner is certainly capable of starting a fire. But to be certain that it will start one, you need to be careful how you set it. If you simply set a candle in the middle of a pile of matches, the flame or heat will most likely reach them and start a fire, but it might not.

Since paper soaked in candle wax burns very well, crumpled paper surrounding the base of a candle will become good kindling. The candle flame will ignite it, but only if the flame gets close enough to the paper. So for the device to be reliable, the paper has to be set where the flame will burn up to it. The same goes for matches.

This problem can be dealt with easily by lying the candle on its side. Tinder, such as crumpled paper, match heads, or a fuse, can be laid on top of the lying-down candle. When the flame, which burns up, reaches the tinder, the tinder will catch fire easily. The tinder is set in contact with other fuel.

A candle lying on its side might set fire to the surface it is lying on, depending on the candle and the surface. To be certain that your candle will not start fire prematurely, lay it extending over the edge of a table, with a weight holding it in place. Or simply lay it on a nonflammable surface, such as a cement floor.

Keep in mind that a candle lying down will burn more quickly than one standing up. To get more delay, set the candle at an angle instead of horizontal. Wax will drip to the lower side, so fuel on the upper side will remain clean; set crumpled paper on the lower side to soak up the wax, and set paper, a fuse, matches, or other tinder on the upper side to take fire from the flame.

To be sure how much time any candle will take to burn down to your tinder, test one just like it, in the same position and atmosphere.

There are a few ways to set a candle standing at an angle. The easiest is to carefully lock the base of the candle in the jaws of locking pliers, with the candle at the desired angle. Another way is to drive a long nail through a thin board, bend the pointed end of the nail to the angle you want the candle to lean at, heat the nail, and push it straight into the base of the candle; as long as the nail-board is secure, the candle will remain standing at that angle. A candle in a candle-holder can often be leaned simply by setting something under one edge of the candle-holder.

A short fat candle won't lie down very well. Often such candles don't burn well in any position. So for a reliable device, use a candle with a more or less traditional candle shape, and that is no more than a few inches in diameter.

A way to use a candle as a timer but not an igniter is to let the candle take the place of the leaking vessel described previously and below. The candle is either anchored securely to a heavy base, or used as a toggle. Either way, it is the thing that keeps a weight from falling. When the candle burns down the weight is released.

No matter how you use a candle, make sure there is no air current strong enough to blow it out. Make sure also that the candle is not in a space that is confined to the point that the candle will use a significant share of oxygen.

A candle can be held standing in a number of ways; here a pair of vice grips is used. Coverless match books rubber-banded to the base will take and expand fire from the candle flame.

A candle used as a timer. Crumple paper and set it around the base, close enough to take fire from the matches. Pile more fuel above and around it, always being careful to not allow paper to get within range of the candle-flame on its way down. Adjust delay time by placement of the matches and paper. This candle burns at a rate of roughly forty-five minutes per inch. If timing is critical, test the candle, or one just like it.

ELECTRICAL SWITCHES

One of the primary advantages of electricity for ignition is that it allows very precise and reliable timers to be set. Whether the source of electricity is a battery or an outlet in the wall of a building, it is a simple matter to install a switch.

An electrical circuit consists of two wires. In the case of batteries one wire runs to each of two terminals; in the case of wall outlets, one wire runs to each of the two slots in the outlet. In either case there are two wires, and breaking either of the wires will stop the flow of electricity. Re-connecting them will restore the flow. A switch is a device that breaks and re-connects one of the wires on command.

WIRE LOOP SWITCH

This switch can be made with nothing but the wire itself, and a tool to cut and strip it; this can be side-cutting pliers, a knife, or something else. It is the most basic of all switches. It works very well for one-shot devices such as those described here, but is of little use in turning a device on and off repeatedly.

If the two wires of your circuit are not already separated, separate them for several inches or so. Cut one of them at the point you want to install the switch. Strip an inch to an inch and a half of insulation off of both ends of the wire you just cut.

Form the end of one of them into a loop around the insulated part of the other one. Leave the loop big enough that the wire will slide in it without too much effort, but not so big that the fit is sloppy. Twist the bare wire around itself to hold the loop secure. Bend the wire between the loop and its own insulation so that the loop is roughly perpendicular to the wire it is formed from.

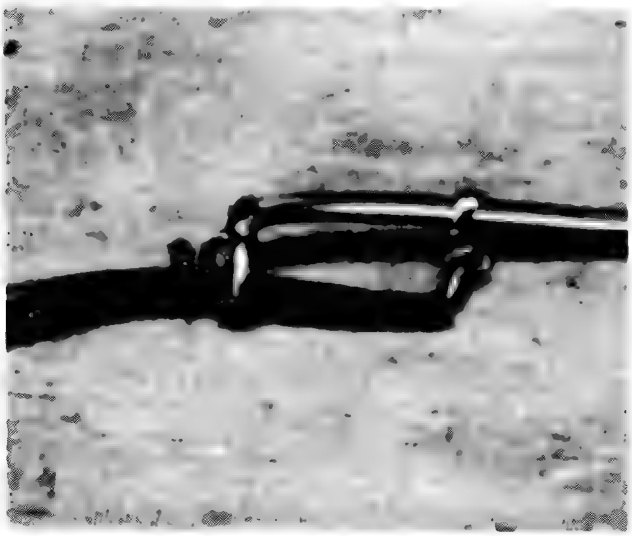
Do the same with the other wire, so that the bare end of each wire is looped around the insulated part of the other wire.

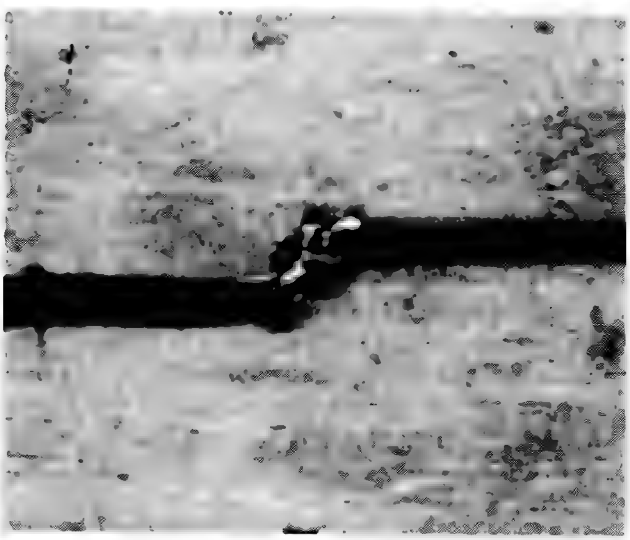
At this point the switch is complete. As long as the bare wires do not touch each other, there will be no flow of current. When the two wires are pulled apart the bare ends will come together, and the circuit will be complete.

Sensitivity can be adjusted by how close the bare parts of each wire are together, and by how well the wires slide in their loops. The latter is adjusted by making the loop tighter or looser, and by the degree of bend between the loop and the wire it comes out of. Keep in mind that the device will activate when any two bare spots of either wire come in contact. A safety can be installed by taping the two wires securely together, with the bare ends well apart.

There are many ways this switch can be employed; details will follow. Usually it is best if a weight or spring (i.e., rubber band) is used to pull the wires together on triggering, so that there is a positive connection between them. This though depends on how instant the igniter they activate

is: an igniter that uses a heated wire might need the connection to be good for at least a few seconds; a light bulb with its glass envelope intact will require a good connection for minutes or hours; a light bulb filament or a short circuit spark will initiate fire more or less immediately when the circuit is complete.





Simple switch. The bare end from each wire is twisted around the insulated part of the other wire. When the wires are pulled apart, the bare end loops come together, completing the circuit.

BARE LEADS AND AN INSULATOR

Another switch is made by simply laying one bare wire over another bare wire, with a weight on top pushing the two together, and an insulator between the two. When the insulator is pulled free, the wires come together and complete the circuit. There are a number of ways this can be done. One will be given here.

The insulator has to be smooth enough that it can be pulled free easily, it has to be big and flat enough to keep the bare wires from touching each other, and it has to be made of material that will not conduct electricity. A piece of heavy paper, such as a matchbook cover, works well. A string or cord is tied and/or taped to it.

Strip around an inch of insulation from the end of both wires. Secure one wire to a surface, such as a floor or table-top, with a piece of tape, glue, bent nail, staple, weight, or something else running across the insulation close to the bare wire. Secure the second wire in the same way, but perpendicular to the first wire and with the bare part of it directly over the bare part of the lower wire, so that it lays against the first wire, and the bare ends form an X.

Insert the insulator between the two bare wires, making sure no parts of the wires can come in contact with each other. Set a weight, such as the corner of a book, over the wires, pushing the top wire down against the insulator. The switch is then activated by the insulator being pulled free.

This switch can be easier to work with if the bare wires are twisted around metal rods such as nails or bolts, and the rods are separated by the insulator. Rub the rods together until they are shiny at the point they contact each other for a good connection. If a heavy enough rod is used for the upper lead, additional weight is unnecessary. Or two rods can be rubber-banded together with an insulator separating them.

CLOTHESPIN SWITCH

A variation of the above switch is made with a spring-loaded clothespin. One bare wire is secured to the inner jaw of each half of the clothespin, so that when the jaws are in their natural closed position the leads are in contact with each other.

The bare ends of the two wires are folded back against themselves and flattened out so that they will definitely make a good connection. They are secured to their respective jaws with tape, being sure the tape doesn't get between the two wires where they come in contact with each other. Or the wires can be secured with a few strands of

lamp cord wire wrapped around them and the jaw. String or glue can also be used, as long as the leads remain secure as the insulator is withdrawn, and nothing but the insulator gets between them. Make sure no bare wire touches the steel spring. Test the trigger with a light bulb before hooking it up to anything dangerous.

An insulator, such as a folded matchbook cover, is placed between the jaws, keeping the leads from touching each other. A tripline is tied and/or taped to this insulator. When that line is pulled, the insulator comes out, the jaws close, and the circuit is complete.

This switch can be activated by falling weight, as covered below, by something like an opening door, or by a tripline directly. No matter how it is used it is a very secure switch, which will maintain the connection reliably.

MANUFACTURED TIMERS

If you intend to use a factory-made timer, such as the kind commonly used to make potential burglars think somebody is home by turning on and off lights, make an electrical igniter as described in Chapter 4, but without putting a switch in the cord. Simply plug the cord in, and the timer becomes the switch. Any outlet that is controlled by a wall switch can be used in the same way, but as a boobytrap instead of a timer.

One of the easiest to use and reliable timing devices is the timer designed to turn lights on and off. This one has an electric burner plugged into it. Match books are laid on the burner, crumpled paper is piled on them, and more fuel will be added over it.

A timer switch with multiple outlets attached to it can be used with multiple igniters, to insure reliability or for some other reason (don't use short-circuit igniters, or you might throw a breaker). With long cords, these igniters can set fires in different locations at the same time. Or they might turn lights on to make it look like someone is at home, and at the same time turn on a light bulb or other heating device that will start a fire a few minutes or an hour or so later. There are many possibilities.

This type of timer can also be a good safety device, used with a boobytrap to insure that the boobytrap is not energized until after the fireman is long gone.

LEAKING VESSEL/FALLING WEIGHT

This timer is the same as the one by a similar name described previously for use with a matchbook igniter. The difference is that the falling weight activates an electrical switch instead of a matchbook igniter. Depending on the type of switch, less weight will probably be needed than with the matchbook igniter.

The switch can be a wire switch, as described above, or any other switch that can be attached to a string or cord and activated by a falling weight. It is a simple matter to set a weight to pull two wires together; make sure you don't use so much weight that you pull the wires apart.

Wall toggle switches can easily be activated by a falling weight if the down position is on. Simply tie the string leading to the weight securely to the switch, and reinforce it with tape. Since up is typically on, it will usually be necessary to use a nail or something else to turn the downward motion of the brick into an upward pull. This means more weight is needed for positive ignition.

CLOCKS, THERMOMETERS, AND BAROMETERS

Anything with moving parts can be made to complete a circuit. Things like clocks, thermometers, and barometers often have a needle used to indicate the thing they measure. If the needle

is made of a conductor, such as steel or aluminum, it can be used as the thing that moves to complete a circuit. These can be set as the primary trigger, or as a secondary safety trigger.

Usually the needle is connected to the body of the device, which is also conductive. So one of the two switch wires is connected to the body, and the other wire is placed where the needle will contact it when it moves. This is often accomplished by drilling or breaking into the glass or plastic cover over the needle, and setting the wire where it does not contact any of the device, but will touch the needle when the needle moves to a certain position.

Use of any of these devices requires a knowledge of the device. Bigger units are easier to work with than smaller ones, but smaller ones are easier to hide. Be sure to test any that you intend to use, with a light bulb or an igniter, to be sure it works.

A clock or watch with hands used in this way will allow very precise timing, up to twelve hours if the minute and second hands are removed. With the minute hand intact it has a one hour maximum.

A thermometer will allow you to start a fire when the temperature reaches a certain point. For example, you might set the device in a building, then turn up or off the heater. Or, in a building where the heat is lowered when the building is unoccupied and raised when it is occupied, a thermometer can be used to target either the building and its occupants or just the building alone. If you can predict that the temperature will reach at least a certain point by a certain time, you can use the device to start a fire by around that time. This might be hours, days, weeks, months, or seasons.

A barometer can be used to start a fire when there is a change in atmospheric pressure. To use it effectively in this way requires a knowledge of when such pressure is likely to change. It can also be used to initiate a fire or explosion in an airplane or jet, because as the airplane climbs the barometric pressure in it falls. The device would have to be kept out of pressurized areas, such as passenger and crew compartments.

CHEMICAL TIMERS

Certain chemicals, when mixed together, produce flame or heat, and can be used to initiate fire. Some react more or less instantly; some take a few minutes or so. For a detailed explanation of these, see "Chemical Igniters" in Chapter 4.

One common chemical timer is made with concentrated sulfuric acid, which will initiate fire when brought into contact with a potassium chlorate/sugar mix, or match heads, or a number of other things. The acid is suspended over the other chemical, and held in place with some form of rubber, so that the acid will eat through the rubber and come in contact with the other chemical and so initiate fire.

This device requires the use of concentrated sulfuric acid, which is dangerous to work with; it has to be carried and stored in an all glass container, because it will eat holes in anything other than glass that it touches. The fumes are also very dangerous.

The timing with this mechanism is imprecise, because it will vary according to the thickness of rubber and the temperature of the air. The colder the air is the slower it will be, and it is recommended that this device not be used if the temperature is below 40 degrees. It is a good idea to test any such mechanism beforehand using the same materials and at the same temperature in which it will be employed.

There are a few ways this device can be employed. One will be given. For it you need around an ounce of concentrated sulfuric acid and a glass bottle to carry it in, a big pile of something that will be ignited by the acid, such as match heads, a vessel with a wide mouth, such as a jar, a thin rubber membrane, such as a balloon or condom, and something to secure the membrane to the wide-mouthed jar, such as string, tape, or a rubber band.

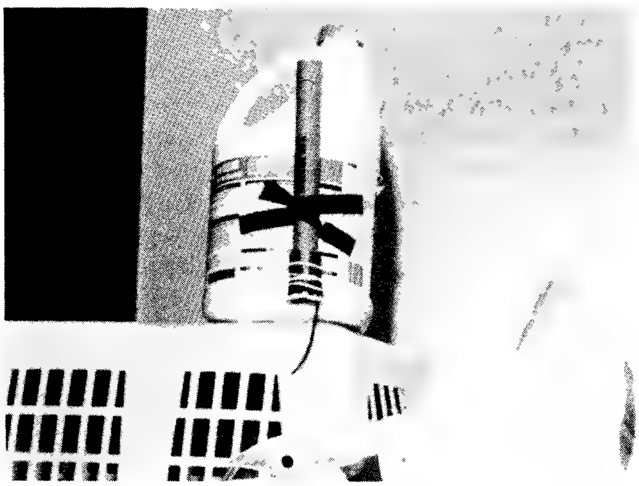
The jar is filled roughly three-quarters full of the solid component of the mix. A balloon or condom is then stretched over the mouth of the jar, with part of the rubber extending down inside, so that the mouth of the jar is sealed, and there is a pouch of rubber to pour acid into. If necessary, secure the rubber to the mouth of the jar with a rubber band, tape, or string; make sure it won't come loose and fall into the jar when you pour the acid in.

Set this jar where the flame coming out of it will reach fuel. Just before you leave, pour the acid into the rubber membrane. The acid will eat through the membrane, and initiate fire.

At 77 degrees, the typical delay time is 15 to 20 minutes; at 40 degrees, delay might be as long as eight hours, and below that temperature the device is not reliable. Times will vary according to thickness of membrane as well as temperature.

PLASTIC JUG OF FUEL

A thin plastic jug, such as a gallon milk jug, can be filled with liquid fuel. A hot igniter, such as a matchbook igniter and a flare, is set under or taped to the jug. When the igniter fires, it burns through the jug and ignites the fuel. The burning fuel spills out of the jug, pouring onto whatever the jug is set on. The jug itself melts and becomes part of the fuel.

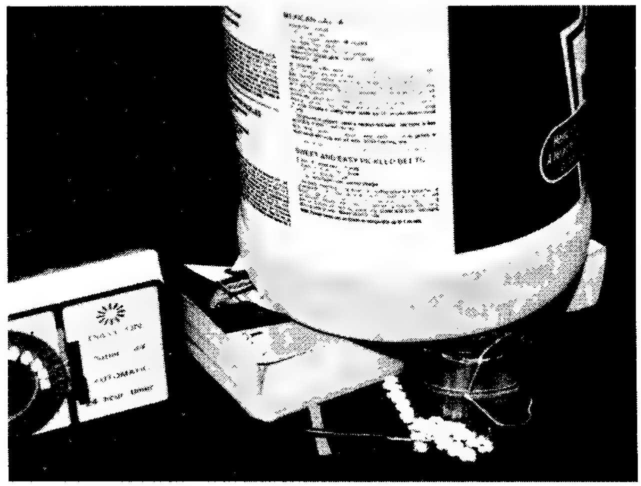


A plastic jug of fuel with a fuse-activated flare taped to it set on a big pile of fuel will get a big fire going quickly. The short fuse shown here will give only a little delay. The plastic under the jug will produce a hot fire and toxic gasses.

How fast this happens depends on how hot the igniter is and how thick and heat-resistant the plastic is, as well as temperature and stillness of the air, and how contained under the jug the leaking fuel is. It can happen pretty quickly, or a slow leak can develop that grows slowly as the leaking fuel feeds it. Removing the jug's lid will let the fire develop more quickly, and also let fumes escape before the device is activated.

The fuel that is used to burn through the plastic can be ignited by any timer that can ignite matches, such as a cigarette, fuse, or something electrical. If a chemical igniter is used, the matches become superfluous. A good fuse usually burns very hot, and can burn through plastic; enough of it can turn a jug into a sprinkler, or even a dumper.

Most jugs need fuel that will burn longer than matches, unless you have a big pile of them. These



A plastic jug filled with liquid fuel is set over a paper/paraffin fire-bug, which will burn through the plastic and ignite the fuel, which will spill out and make a big fire. Ignition is by a hot wire set between match heads activated by an electrical timer.

Many lethal fires are started by a cigarette left lying on upholstery. This road flare lying under a jug of fuel on an upholstered chair will get a big one going much more quickly. A long fuse gives the fireman plenty of time to get out. Unless there is a good reason to the contrary, interior doors should remain open; the drawers of the file cabinet should be open part way so that their contents can burn better. The semi-enclosure made by the wall, door, and file cabinet will concentrate heat.

need the addition of kindling, such as paraffin/paper, factory-made fire-starters, and road flares. This kindling can simply be set under the jug.

If it is necessary to attach the kindling to the side of the jug, use wire, or something else that will not burn through, and make sure the kindling is set where its fire will reach the fuel. Use tape for something like a road flare, that will burn through the plastic before the fire gets to the tape.

Test a copy of any device you intend to use, if possible. Keep in mind that burning through an empty jug isn't the same thing as burning through a full one, because the liquid inside can carry away enough heat to prevent burn-through. So if you don't have a place to test a particular device on a jug filled with fuel, fill the jug with water; you'll be able to see whether or not the fuel burns through the plastic. If you can get a good, steady leak of water without putting your igniter out, you know that fuel will definitely get out and catch fire.

Make sure the jug is filled, to maximize the amount of fuel.

An alternate method of employment is to hang the device and run the load line to a leaking vessel. Ignition comes from matchbook igniters and kindling (i.e., a road flare) taped to the side. A heavy jug doesn't have to fall far to activate an igniter and a back-up or two. Make sure the igniters are taped on very securely. When the jug hits it will burst if it falls far enough, making the road flare more or less superfluous, but it's a good idea to use overkill in your systems whenever you can.

The device should be set above, on, or in a pile of solid fuel, so that when it is activated fuel will pour out of it onto the fuel. The top of a staircase is a good place for it, or on a chair in a corner. It has other applications as well.

It is theoretically possible for liquid fuel pouring out on burning matches or other fuel to put the fire out, but it isn't very likely, depending on the strength of the flame; you don't have to worry about liquid fuel putting out a road flare. This is a good reason to use good kindling.

CONCENTRATED SUNLIGHT

Set a magnifying glass or mirror on a table or ledge in such a way that the sun's light will set fire to tinder you have placed for it. You will probably need to do quite a bit of experimenting to find a place that will work without you holding the glass. You might have to build up to a point the glass can concentrate its heat on instead of building to a point to place the glass. A magnifying mirror should be easier to work with than a glass, especially if you want to make the fire appear accidental.

When you find two points that you know will start a fire, simply cover the glass until the sun passes, and set new tinder for it. Be sure you don't pile tinder up so much that you alter the point of focus. The next day when the sun passes it will hit the glass at the same time as before, and if it started a fire before it will start one again. Unless there are clouds in the way or some other essential condition is different, in which case the next day with sufficient sunshine there should be a fire.

This timing device is a variation of the old sun dial clock. Like the clock, it can be pretty precise. For more on how to magnify sunlight, see "Concentrated Sunlight" in Chapter 4.

BOOBYTRAPS

If you set a timer or a remote, you might also want to set one or more boobytrap triggers, in case someone comes to disable your device before it fires. Or you might use a boobytrap by itself, if your target is people. A pre-set boobytrap might act as a rear guard as you escape. Boobytraps might also be set at exit points, to cover them with fire when fire is set to a building filled with enemies.

The word boobytrap implies stupidity on the part of the one who activates the device. A boobytrapper needs to treat this implication as false, even though it isn't always. If a boobytrapper does his job right an intelligent and aware person will activate his device for him as easily as a stupid one will. The implication of boobyhood on the part of the one who activates the trap is simply a reference to the fact that the subject is intended to pull the trigger on the weapon that kills him.

This is not simply a matter of semantics, it is an important point: respect the intelligence and awareness of the ones you intend to trap. Empathize with your opponents. The rest is a matter of simple mechanics.

A boobytrap can dump burning fuel directly on one or more people, or start a fire discretely in another location. A remote trigger on

an incendiary boobytrap will allow you to start a fire after you know that at least one person is in the building, that will have time to grow before anyone is aware of it.

A boobytrap should not start a fire where the people who activate it are aware of the fire unless the fire is big enough to attack them. Otherwise they will be able to put the fire out, or at least escape and warn others. This of course suggests the use of a small fire to draw people into a big one, or drive people to more boobytraps. There are many possibilities.

An old book by me, The *Black Book of Boobytraps*, covers this subject in more detail. In this book only a few aspects of the subject will be covered, and only as they relate to the use of fire.

TRIGGERS

A trigger is something that will be manipulated by the target of a boobytrap, that will cause the device to fire. The boobytrap contains some form of potential energy, such as electricity or suspended weight; the trigger releases that energy, such as by completing a broken circuit or allowing the weight to fall. There are many ways for this to be accomplished; a few will be given here.

A trigger can be set close to the fire it starts, as in a drum set to spill down a staircase when a door above or below it is opened. An igniter set close to its trigger needs to start a very big fire more or less immediately.

DOORS

A door is something that has to be moved to gain entrance to some areas, so doors are common boobytrap triggers. A cord nailed or taped to a door can pull a pin, pull bare wires together, or pull a container of liquid fuel off a table. A door with a board set in front of it can push a prop out from under a dumper when the door is opened.

If a door is used as a trigger for a big, sudden fire, as in a door pulling a bucket of fuel off a table, the hinge pins should be removed. That way when the door is opened and a big fire starts suddenly, a subject with fast reflexes can't slam the door shut. To make it look like the hinge pins have not been removed in case someone has a sharp eye, cut the heads off the pins and set them where they normally set. You might need to use shims made from something like folded paper to make the door without its hinge pins set right.

Since a fire burns and spreads much better in a building with doors open, remove as many hinge pins as you can. Remove automatic door-closers too.

PIN AND EYE

Gravity is an ever-present, easy-to-use energy source. A falling weight can activate a matchbook igniter, an electrical switch, or a number of other devices. There are many ways for a weight to be held suspended, and released when something like a door or tripline is moved. Among the most simple is the pin and eye. The same trigger can be used with other forms of potential energy, such as springs and rubber bands.

The weight is held suspended by a cord, referred to hereafter as a load line. This line runs through an anchor directly over the weight. The pin and eye can be installed at this anchor, or the anchor can turn the line, and the pin and eye installed somewhere else.

At the point where the pin and eye is installed, with the load suspended, the load line has a loop in it. The pin and eye consists of an opening (the eye) that this loop passes through, and a pin that runs through the loop as a toggle, keeping the loop from pulling out of the eye. When the pin is pulled out of the loop, the weight falls.

The easiest way to make an eye is with a screw eye, available at hardware stores. Two parallel nails or a bent nail can also be used for the eye, but the boobytrapper needs to make sure that the loop in the load line doesn't catch on the end of one of them. A hole in a wall stud can be an eye. Two holes in drywall can be an eye; the load line runs into one and out the other. There are many possibilities.

Anything that can be used to keep the line from running back out of the eye can be a pin. This might be a nail, tooth pick, spoon handle, or a number of other things. Make sure it is strong enough to hold the weight, and smooth and straight enough to be pulled out easily.

The pin is attached to a cord, so that when the cord is pulled the pin will follow. This cord can be a tripline, or it can be attached to a door, window, or anything else that might be moved by the target, so that when the thing is moved the pin is pulled.

Using a Door as a Trigger

Removing the hinge pins will help to insure that a door will stay open after it has been opened, allowing fire to spread quickly through the doorway. The frame will hold the door in place until it is opened.

When the upper hinge pin is removed the door will sag a little in the frame; a close look at the hinge will show that there is no pin in it. The target of the incendiary attack might not notice (especially if he's panicking), but if he does he might avoid the trap.

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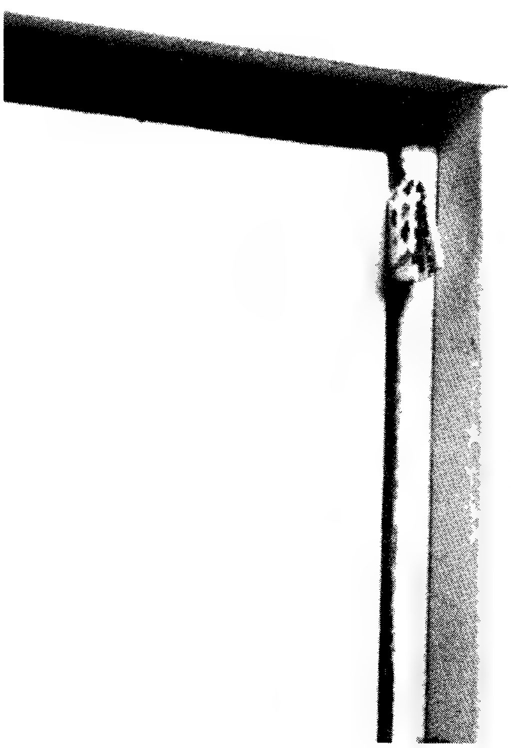
Using a Door as a Trigger

The hinge alignment as a result of shimming is evident.



A shim, such as a folded matchbook cover, stuffed between the door and frame will make the hinge line up. The shim is pushed in far enough that it can't be seen.

If the top of the hinge pin is cut off and set on top of the hinge, the hinge appears normal (until the door opens). Leave a quarter-inch or so of pin, to hold the cap in place.

The pin and eye is not an especially sensitive trigger. There are ways to make it more sensitive, but with the relatively light weights used in fire-starting, they should not usually be necessary. But if you want to connect this trigger directly to a tripline instead of something like a door, you might need to make it more sensitive.

A tripline is usually used in the dark or under water or in tall grass. If it is used in the open an observant subject will probably see it and avoid it. If your trigger is sensitive enough sewing thread makes a good tripline, but even it shows up, even if its color matches the background.

Usually a tripline is set a foot or so off the ground. A falling weight used to activate a matchbook igniter needs to fall farther than that. So the load line needs to be turned and run to the pin and eye.

For information on how to use a falling weight with a matchbook igniter or electrical switch, see the previous sections under the subhead "Timers" with "Falling Weight" in their names.

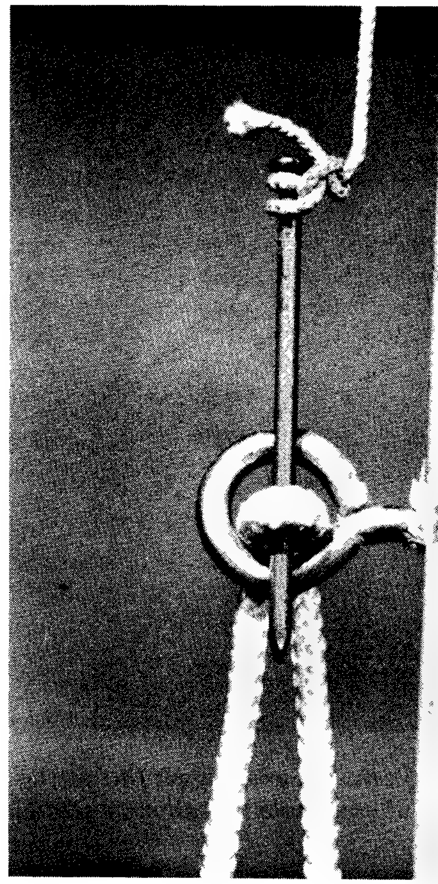
BALANCED WEIGHT

An easy way to make a very sensitive trigger is to set a weight, such as a brick, on a ledge so that it is almost ready to fall off. A line tied to the brick will easily pull the brick off the ledge if the brick is about ready to fall anyway. The falling brick can then pull a pin out of an eye, activating one or more triggers, or it can directly activate a matchbook or electrical igniter.

The more sensitive this trigger is set the more susceptible it will be to being activated by disturbance, such as vibration. This gives the device an added dimension, and in some cases a weight about ready to fall might be used with no line, and be disturbance-activated only. Such a trigger is very dangerous to work on, and so should be avoided, unless there is a very good reason for it.

A variation of this trigger is made by using a nail driven into a wall as the ledge the brick is balanced on. Set the weight so that the tripline tied to it holds it from falling off the nail. In this way the weight will fall off the nail whether the tripline is pulled, broken, or cut. The weight leaning and pulling against the tripline keeps the tripline tight.

Pin and Eye Trigger



The pin and eye trigger consists of an eye with a loop running through it and a pin holding the loop from pulling out of the eye. The loop is in the end of a line that supports something like a glass jug of fuel, weighted matchbook igniter, or vial of acid. A line runs from the pin to a boobytrap, timer, or remote activator, so that when the line is pulled the load is released.

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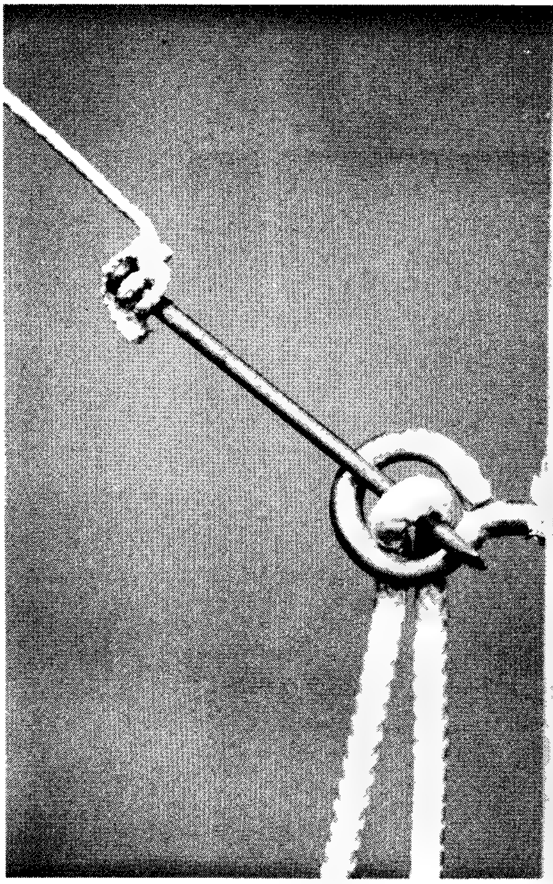
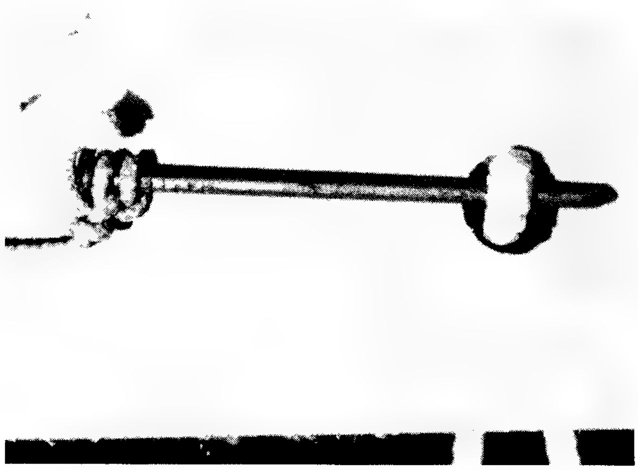
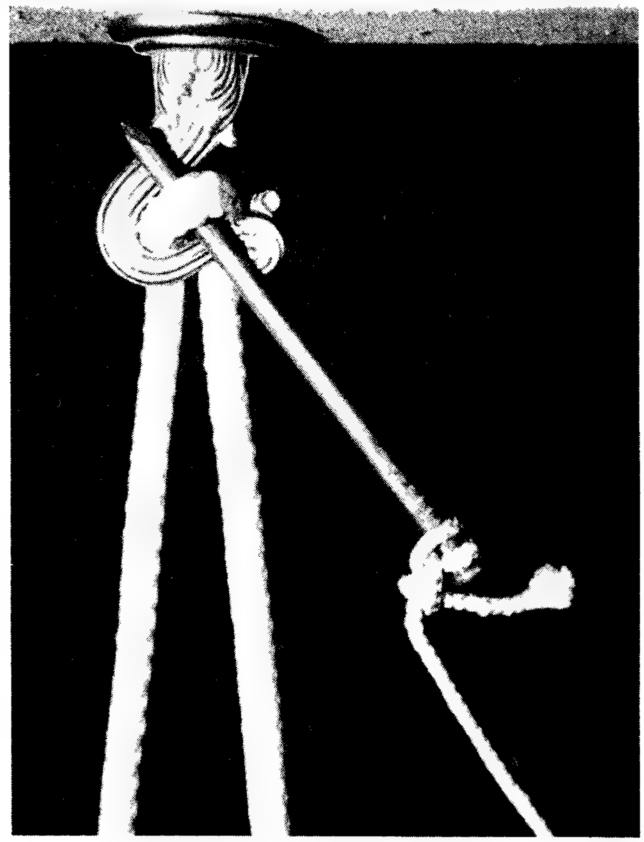
Pin and Eye Trigger



With a complete eye, the pin and trigger line can lead away from the eye at any angle that allows a straight pull.



A hole in a ceiling joist can be an eye, as long as it is big and smooth enough to let the load line run free.



Sometimes eyes are already in place, but they might not be as good as one you supply yourself or make. This plant hook is very selective in the angle at which the pin has to set, and if the pin does not pull straight out it might cause the loop in the load line to slip over the hook, causing the device to fail.

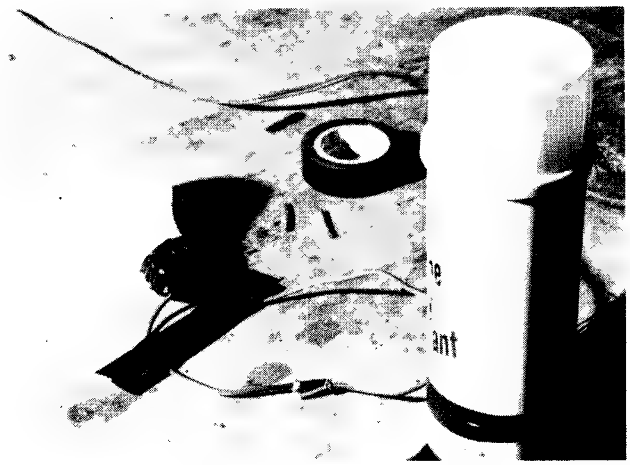
PROPS

A weight or vessel set on a ledge can be held in place with a prop extending from the floor up to the bottom of the vessel. The vessel is set with its center of gravity over the edge, so that when the prop is removed, the vessel will fall. If the center of gravity is just barely over the edge, the prop will have little weight on it, and the trigger will be very sensitive. The weight is attached to a matchbook igniter or electrical switch.

The prop is attached to a trigger that will either pull it or push it. If a door is the trigger, a cord will run from the door to the prop if the door pulls away when it opens. If the door opens the other way, something rigid, such as a stick, will be secured to the door and prop. Either way, the cord or stick should be attached to the prop toward the top or bottom, not the center.

The point this line attaches to can be divided, as in two or more cans stacked together as a prop. In such a case the cans must be stacked so that even if the pieces don't fall as intended the vessel will still tip over.

A load line, as described in subhead "Pin and Eye"previously, can be used instead of a prop.



Simple electrical switch activated by a falling weight. The weight is supported between the edge of a table and a prop. Very little force is required to remove the prop, so a trigger attached to it can easily be very sensitive. It can be activated from nearby or from a distance. The intact light bulb allows the device to be tested.

FIRE

A hanging weight can be released by fire, if the cord it hangs from will burn and the cord is brought into contact with fire. The same ignition that releases the load line can initiate fire in the fuel that spills over it, if it burns long enough and hot enough to still be burning when the rope breaks and the fuel spills. In this way more fuel vessels can be added without having to make more than one or a few complicated triggers.

DUMPERS

A dumper is a vessel containing liquid or powder set to dump its contents when its trigger is activated. It can be a can, bucket, or drum; the mechanism is essentially the same in each case. It can dump fuel, and ignite the fuel as it dumps it. Or it can dump one chemical onto another, causing chemical ignition. It can be hung from a load line or stood balanced over a ledge with a prop.

A dumper hanging from a load line is rigged and triggered the same way as the falling weight described above, under the subhead "Pin and Eye." The difference is that on a dumper another cord is tied securely around the bottom of the vessel and secured to an anchor, so that when the load line releases the second line catches the vessel from the bottom and holds the bottom in place, causing the vessel to turn over. Aim is set by placement of the secondary anchor in relation to the primary anchor. It should be set as low as possible.

Setting a prop under a dumper so that it will fall over is usually easier than hanging one. If a bucket or drum of liquid fuel is spilled from the top of a flight of stairs, burning fuel will pour down the staircase, which is an escape route, a passageway for fire to travel between floors, and a chimney. Since stairs are uneven, rigging is relatively easy.

If there are doors at the top and bottom of the staircase, they must be open during the fire for a good air flow. One or both can be attached to a tripline, and used as a trigger. Remove the hinge pins from both doors so that the force of the fuel and fire can push them open if they are not already so.

In rigging, set the drum so that it is stable when it is empty, then fill it; the balance won't change when it gets full. Just make sure it's secure. Have it tied off securely as you fill it and work on it, but leave the safety line loose enough

to be sure that it is not what is supporting the weight. Attaching the second half of the igniter and cutting the safety line should be as close as possible to the last things you do before you leave.

To keep fumes from evaporating and giving away the trap, the dumper should have a cover. This cover needs to fit loosely, so that the force of the contents being dumped will push it out of the way. A garbage can or drum lid will do these two things as long as there is no locking mechanism engaged. Plastic kitchen wrap can be tied on with string; igniters are placed so that they burn through the string and plastic as the vessel dumps.

Even with such lids, vapor pressure will still cause some fumes to leak out, depending on temperature and fuel volatility; it will be less of a problem with less volatile fuel, such as fuel oil. Mixing motor oil in with gasoline will likewise result in less fumes. Less volatile, thicker fuels of this type are better anyway.

Fumes will be produced when filling the vessel, so there should be no cigarettes or pilot lights, and there should be a means to vent the fumes outside. Don't spill any fuel because it will be hard to get the smell out or cover it if you do.

DUMPER IGNITION

Matchbook igniters are attached to a dumper on the outside just barely below the rim, on the side opposite the secondary anchor, so that fuel pouring out will not hit the matches themselves, but the fire from the matches will hit the fuel. The dumper itself is the weight that activates them, by a cord running from the striker to an overhead anchor.

If a lid extends down over the lip, as is common, set the igniters low enough that the lid will not keep them from pulling straight out; tape matches behind and above them to carry fire to the lip. Use plenty.

Tape one or more igniters on very securely, but do not attach the strikers to their cords until just before you leave. Fold the strikers out of the way and tape them down for safety. Before you leave the area, run a line from the strikers to one or more overhead anchors, so that when the dumper moves downward, the strikers are pulled. One igniter should be plenty, but more will increase reliability, and matches are cheap.

Big Boobytrap Dumper

A vessel filled with liquid fuel is set on a ledge and held with a prop; matchbook igniters will initiate fire when it dumps. A staircase has many ledges, and is a good place to start a fire. Hinge pins should be removed from the door that activates the device.

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Big Boobytrap Dumper

The dumper is set on a ledge with its center of gravity barely over the edge. Food cans under the free end act as a prop, holding the dumper secure; they are also on a ledge. A line runs from the prop to a door, so that when the door opens the prop will be pulled out, and the dumper will spill.

Multiple matchbook igniters are used to insure ignition. They are secured by first being tied under the upper rim of the dumper.

The igniters are then taped securely in place just under the lid. The lines leading off the strikers are secured to an overhead anchor just before you leave the area. The lid is set on the garbage can to contain fumes, but not locked, so that when the dumper falls the lid will be easily pushed out of the way by the spilling liquid.

A dumper can also activate an electrical igniter, as explained under the subhead "Leaking Vessel/Falling Weight" in "Timers." The igniter can be on the dumper itself or somewhere else.

A dumper can also be used with pre-existing fires, such as candles, liquid fuel lamps, torches, and pilot lights. Be sure the fire is protected from the wave of liquid fuel, or it might be extinguished. Set it where it will contact fumes.

A dumper mechanism can be used with chemical ignition. Since it dumps something, the thing it dumps can be or contain a chemical that reacts with a chemical that it dumps on. For example, a small cup or can containing brake fluid can be set to dump onto a pile of calcium hypochlorite, or a glass of concentrated sulfuric acid can dump onto a pile of match heads. See Chapter 4 for more information on those chemicals.

There are many other ways a dumper mechanism can initiate fire. Any igniter that can be activated by falling weight or mixing of chemicals can be fit onto or around a dumper.

For a more complete explanation of rigging the dumper mechanism, see *The Black Book of Boobytraps.*

BOTTLES, JARS, AND JUGS OF FUEL

This firestarter is essentially just a Molotov cocktail with a boobytrap igniter instead of a wick. A breakable vessel containing fuel is set to break and spill its fuel on triggering; the action of the vessel falling is used to activate an igniter, so that the spilled fuel burns. The way to make it is to either hang the vessel or set it on a ledge supported by a prop; a trigger is set to release the line or remove the prop. For an explanation of how to do this, see the sections with "Falling Weight" in their name above; see also "Props."

The vessel has to hang or set high enough to break reliably, and it has to fall onto a surface hard enough to break it. This can be a cement floor, a brick, a frying pan, or a number of other things. The area around and below where it hits is set with good fuel.

A matchbook igniter is a good and easy-to-use igniter for this device. Simply tape the igniter securely to the vessel, and tie a line from the striker to an overhead anchor. Leave enough slack in this line to be sure that the vessel will develop enough momentum to activate the igniter.

A matchbook igniter has two burning phases: the match head phase, which is very hot and lasts for around a second, and the match stick phase, which is less hot but lasts for several seconds or longer. A freefalling body will travel sixteen feet in its first second of freefall. So the hot-burning phase of a matchbook igniter is plenty long enough to ignite fuel in this manner, as long as it is not activated at some ridiculous height.

If available, more matchbooks should be added even though one should be plenty. Multiple igniters should be attached as back-ups. Matches are cheap. Just be sure that the combined force needed to pull the multiple strikers is not greater than the momentum of the falling vessel.

Chemical and other igniters can also be used with this device. The self-igniting Molotov cocktail explained in Chapter 5 can be hung and dropped on triggering. A jar of acid can fall and break against a rock surrounded by a pile of match heads.

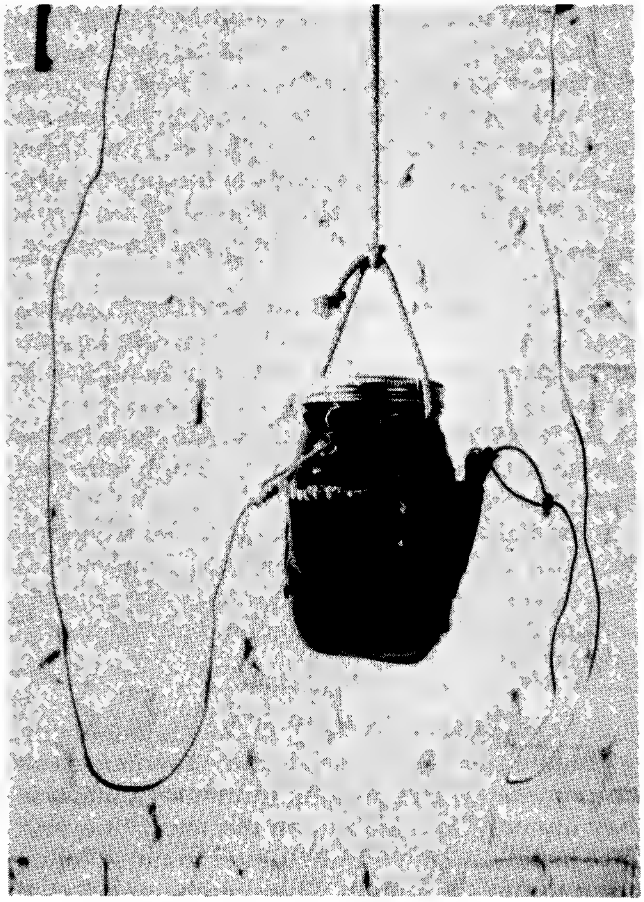
Rigging a jar or bottle to hang is easy. Simply run a cord across the bottom and up both sides opposite itself, and tape the cord securely in place, at the bottom, sides, and top. Tie the ends together over the top and tie the load line with an open loop to the top of the cord; it will find center on its own. Make sure the bottle is clean enough that tape will stick to it.

Another way to hang a bottle is to set it in a bag or make a bag out of a piece of cloth, and tie that to the load line. The igniters are taped to the bottle, and their lines are run up through holes in the bag. Bottles with handles and finger loops are rigged by simply tying the load line through the handle.

For more on this mechanism, see the section "Molotov Cocktails" in Chapter 5, and think about what you would have a one-act robot do with the device.

PLASTIC JUG OF FUEL

A jug of fuel, as described under "Timers," can be activated by any boobytrap trigger that can light a fuse or matches. Use a flare or something else that burns very hot so that fire will develop quickly from it. Set overhead, burning fuel will rain down. Set in a remote location, a big fire can get real big in a hurry.



A quart jar of napalm hanging from a load line can be released by a timer, boobytrap, or remote. Two igniters and extra matches are used, to increase reliability. The lines to the strikers have enough slack to activate the igniters a few feet above the floor.

To attach the jar securely to the load line, tie a big loop in the line with a bowline or other non-running knot. Set the jar on the line at the bottom of the loop, and with the line running straight up opposite sides of the jar, tape it securely in place. Then tape the igniters securely in place. Make sure the jar falls far enough to pull both strikers and break. The rope across the bottom will cushion the fall a little.

ELECTRICAL SWITCHES

Electrical igniters can be activated by a boobytrap trigger as easily as by a timer. The trigger is simply something that completes a circuit. See the previous sections above titled "Wire Loop Switch" and "Bare Leads and an Insulator," under the subhead "Timers."

These switches are used for boobytraps in about the same way they are used for timers. Both are activated by a line being pulled, either to pull bare leads together or to remove an insulator from between them.

The most reliable way to bring the ends of looped wire together is with a falling weight. One wire is secured against movement, by being taped down or tied around something. The other wire is secured to a weight, such as an aerosol can. The weight is suspended and attached to a trigger mechanism, like a pin and eye or prop. When the trigger is activated the weight falls, pulling the bare leads together.

There should be enough weight to make a secure connection, but not so much that it will pull the wires apart.

A wire loop switch can easily be attached to a door, so that when the door opens the bare wires come together, completing the circuit.The wires are held with single strips of tape, so that if the door opens wide and forcefully the tape will give (after the circuit has been completed) instead of the wires pulling apart.

This switch can be activated by being connected directly to a tripline or similar device, such as a door that will open. Either of those methods will make a connection, but it might be less secure than one made by hanging weight. Some igniters require a few seconds or longer to work, and so require a connection that will last. Some igniters are instant, and so only need a connection for that long.

The Clothespin switch and Bare Leads and an Insulator switch can be reliably activated by direct action of a tripline; once the insulator is pulled free the wires will stay together.

Any electrical switch can be set close to the igniter or far from it, if there is enough wire and current to reach.

One big advantage of an electrical trigger is that you can use it together with an electrical timer switch, to be sure that your device remains unarmed until you are long gone. This makes rigging far safer.

FACTORY-MADE SWITCHES

Toggle and other manufactured switches can simplify boobytrap rigging immensely, because they are easy to install in an electrical line, and once installed it is a simple matter to cause something to flip the switch. They can be purchased from hardware stores for well under a dollar. Rigging will be simplified further, and also be much safer, if you set the switch in a work box, also available for under a dollar.

A great many types of switches are available from hardware stores and hobby shops. The right one will make it easy to build a battery-powered device into a compact package, or set a bigger device in a building using the building's own electricity.

Switches already installed in the house circuit can be very easy to use. If the thing they activate is turned into an igniter, the switch has been installed for you. The target might activate the switch himself. Or a line can be run from a door or any other obstacle that will be moved, and channeled so as to activate the switch when the obstacle is moved.

MOTION SENSORS AND OTHER SPECIAL SWITCHES

An outlet controlled by a motion sensor can be used simply by plugging into it, or by using

the thing it activates (i.e., light socket) to initiate fire. This means you will have an invisible tripline.

Make sure you read the instructions well if you use any of these devices, and don't blow yourself up. Since any switch you don't know might go off unexpectedly, it would be a good idea to get to know the switch and have a circuit tester. A motion detector might be used together with a timer, for safety and other reasons. Test the device you build with a light bulb before attaching anything dangerous to it, and make sure you can get away without activating it.

Other kinds of switches can also be useful. Some lights are wired to go on by being touched. Photo switches, activated by absence of light, can be used to start a fire when somebody turns a light off.

TRAP DOOR

The oldest trap known to Man is probably a covered pit. A newer version of the device used in man-made structures is a trap door. The action of a trap door opening can pull the striker of a matchbook igniter, complete an electrical circuit, or bring chemicals together.

A trap door is not an easy thing to make, because it usually involves cutting through two or more layers of wood. You need to look underneath and make sure there are no pipes, wires, or ducts in the way. To make sure that a person will fall through, it should be two or more feet square; this means you probably have to cut through joists. If you have carpentry skills you can figure out how to do it, but it will still be a lot of work.

There are many ways to make a trap door. One of the easiest and best is with finger bars. These are small pieces of wood tacked to the underside of the floor that extend into the opening the trap door covers. The tops of the finger bars are level with the bottom of the floor, and the trap door, which is probably the piece cut out of the floor, is the same thickness as the floor. There are four finger bars, two on each of two opposite sides, close to the four corners and opposite each other. When the trap door is laid into its opening, the finger bars keep its top level with the top of the floor.

The finger bars are installed so that their tops run right along the bottom of the floor and straight into the opening. They are not secured to the point that they will not break free when weight is put on them. If weight is added to the bottom of the trap door, they must be nailed more securely to compensate. You want a person to have to put more than a few pounds on the trap door to open it, so that he will be more likely to fall with it.

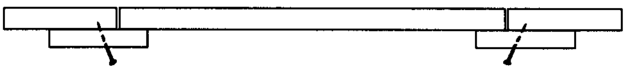
The trap door probably has enough weight to activate one or more matchbook igniters. If not, weight can be added to the underneath side. Igniters are attached to the underneath side as well, and their strikers are attached by a cord to an overhead anchor, so that when the trap door falls it will carry burning matches with it. More matches, and fuel to extend burn time, can be added.

Below the trap door and a little to one side, set a large vessel, such as a garbage can or drum, on a ledge, such as a table, with the center of gravity of the vessel barely on the table, so that it can be made to fall off with very little effort. A flat board, such as a shelf or door, is set between the top of the table and the bottom of the drum, extending out underneath the trap door. Downward pressure on this platform will tip the drum over.

If the platform is big enough and the trap door falls straight, it will hit the board, which will act as a lever and dump the drum, if the trap door has enough weight. The subject that steps on the trap door will probably fall through and his weight will easily be enough to tip the drum over, but he might catch himself and not fall through all the way, so make sure the trap door itself weighs enough and the drum is balanced precariously enough that the door alone hitting the platform will spill the fuel. Adding weight to the bottom of the trap door will simplify this.

If you cannot be sure that the falling trap door will spill the fuel, set the drum on a ledge with its center of gravity barely beyond the ledge, so that without support it will definitely fall. Support the free side by a load line running up to the trap door, so that when the trap door falls, the overhead support falls. Or run the load to an overhead eye and let the trap door pull the pin. This rigging makes it a little more difficult to put a lid on, because a line is running up from one side of the top of the drum. Cut a slot in the lid for the load line to fit through if you have to.

Alternatively, a drum can be set with a platform under it, and its center of gravity barely beyond the edge of a table. A load line runs from the far end of the platform up to the trap door, so



Two-dimensional side view of a trap door held by finger bars. Four small, flat pieces of wood are partially nailed to the underneath side of a floor; the trap door is set on them, its top level with the floor surrounding it. When weight is applied by the target, the nails give and the door falls.

that when the door opens the dumper tips over. This makes it easy to put a lid on.

Igniters should be attached to the dumper as well as to the trap door, to insure ignition. Treat every igniter as though it is the only one.

The drum and ledge should be set where the fuel will be concentrated as much as possible below the overhead opening. Set it to dump toward a wall or corner instead of away from one. Upholstered furniture, curtains, clothing, and other absorbent solid fuel can be set to contain the spill, as well as adding itself to the fire. More fuel can be piled on top, to add more heat and more poison gas to the fire. More liquid fuel vessels can be added as well, held suspended by cords that will burn through right away, or triggered by falling weight.

Since a trap door is an opening between two different levels of a building, it can be very effective in attacking the occupants of the building. A big fire that starts directly below it will burn up through it, spreading quickly to both levels.

If one or more trap doors like this are set at escape routes, and fire is started in another part of the building, people will be bunched up and panicking at a point above the fire's origin, which will increase casualties. It will also shut off the escape route, if the hole and fire are big enough. Nail or wire the door shut from the outside if you can just to be sure.

LIQUID FUEL LAMPS

A Molotov cocktail can be hung with non-burning rigging like wire, or propped up, and used as a boobytrap igniter. On triggering it falls and breaks, and the wick lights the fuel. The sooner after activation it is used the more power it will have, but with suitable tinder a small amount of fuel, or even just the burning wick, can be enough.

A Molotov cocktail might be cannibalized and used in this manner. For more information, see "Molotov Cocktails" in Chapter 5, "Liquid Fuel Lamps" in Chapter 4, and "Bottles, Jars, and Jugs" in this chapter.

TORCHES AND CANDLES

A torch that can be stood up, such as a cutting torch, a propane torch, or a butane lighter with the fuel button taped down, can be stood leaning and kept from falling over by a string. The string can be attached to a pin and eye or other trigger. The torch is set so that when it falls its fire will come in contact with fuel.

Propane torches, used for plumbing and other things, are fairly common. Cutting torches are common in industrial areas. Butane lighters are common almost anywhere.

Set the torch where you can be sure that when it falls its fire will contact its intended fuel. It might be necessary to build guides, such as stacks of books, to make absolutely certain it falls where you want it to fall. As with a candle, have it fall no further than necessary.

A torch has a bigger flame than a candle. A standing torch can be used in the same way as a candle, but it doesn't require as sensitive of fuel. If you can guide a torch so as to fall exactly where you want (not a difficult feat), you can have it fall and blow fire into something like a plastic jug of liquid fuel, or various tinders, such as wadded up paper.

A butane lighter is a smaller, weaker version of the same thing. If it falls onto a pile of tissue paper, gunpowder, match heads, or other sensitive fuel, it can get a big fire going quickly.

The same thing can be done with a candle.

REMOTES

A remote firing device is an extended trigger. It allows you direct control over the time of ignition without the time being pre-determined. In this way you can adjust the time the fire starts to changing conditions. For example, if you know a group of enemies will occupy a building, but you're not sure exactly when, you can hide outside and watch the building, starting the fire when you know it contains the desired occupants. A boobytrap can be used for the same purpose, but the remote gives you more control. A few boobytraps might be set as back-ups.

EXTENSION CORDS

If your igniter is electrical, an easy way to make a remote is to use an extension cord. All you need are the two main wires of the extension cord; the ends of the cord and ground wire are not necessary. The ends should be cut off and the ground folded or cut out of the way. Strip a half inch or so from each of the four ends. Wire the two leads at one end of the cord to the two switch wires; when the two leads at the other end of the cord come together, the device will fire.

An extension cord can only be used if the current is strong enough. Even copper wire gives resistance, and if there is too much of it, the current will be weakened to the point that the device will fail. Typical house current should be able to handle at least a hundred feet or so. Flashlight batteries can only handle a few feet or even inches; bigger batteries can handle more. Whatever you use, test it with a light bulb to be sure.

The extension cord can be hidden by being run under rugs and through a shallow ditch. Books on home improvement will give you many ways to hide a wire, in hollow walls, above ceilings, and so on.

ROPES

If you use a matchbook igniter and weight, a chemical dumper, or anything else that can be held suspended by a pin and eye, you can run a cord or rope from the pin to your position.

The cord should be as straight as possible; every turn it makes will make it harder to pull. If it is run through a ditch and covered up the ditch needs to be very shallow, or the dirt piled on the cord might keep it from moving when you pull it. Test it to be sure.

This is a relatively short range remote, but it is good enough to get you out of a building when you trigger the fire. If the fire might be an explosion, you might want a longer range extension.

RADIO-CONTROLLED TOYS

Airplanes, cars, and other toys with moving parts controlled by a radio signal can be used to activate an igniter. Find out which button on the remote causes which part to move, and attach that part to an electrical switch. Make sure the signal will reach the device from where you the sender will be; walls and distance might cause it to fail. You might need to use it together with an extension cord that sets the receiver outside.

Use of this sort of device requires a knowledge of the device that is beyond the scope of this book. Study the owner's manual and anything else you can find to figure out how best to employ the device.

TELEPHONES

Arsonists have used telephones to initiate fire from a remote location. One way is with an answering machine, which turns on a recorder after so many rings. This is a switch. A knowledge of how the machine works is necessary. Study the owner's manual and take it apart if you are good at that sort of thing. Or get a job with the phone company.

The problem with the use of telephones as remote firing devices is that there is always a possibility that somebody other than you will call the number and start the fire before you want it to start. Calls from telephone solicitors and wrong numbers are aggravating at best, and they can come at any time. You might leave a message that says "you just started a fire, nimrod." If you can figure out how to adjust your answering machine, set it to answer after something like twenty rings, to avoid nimrods.

COMPUTERS

If you are able to use a computer to affect the physical world, you can set it to pull a pin or complete a circuit. With the rest of the information in this book, that and how to use a computer are all you need to know to be able to set fires with a computer as the triggering device. The computer can be a timer, boobytrap, or remote.

FUSES

In addition to being a timer, a fuse is also a remote, because it allows you to initiate fire at one point from another point. It can allow you to put distance or shielding between yourself and your fire or explosion.

A fuse used as a remote will usually be long, though not necessarily, when shielding, such as corners, is used. Even a short fuse is also a time-delay mechanism, whether you want it to be or not. A fuse made by pouring flammable liquid on the ground will usually carry fire petty quickly.

Don't pour volatile fuel on the ground and let it evaporate before you light it. In the open the entire amount might evaporate and dissipate, leaving you without a fuse. In any chamber the fumes might explode when you strike the match. Make sure you are outside of any chamber and protected by shielding before you strike a match if you have poured a volatile fuse.

ROAD FLARES AND FLARE GUNS

For initiating fire in one place and tossing it to another, a road flare is like a super matchbook, that just keeps going. A matchbook igniter can be taped to it for easier ignition. It provides a hot, long-burning flame that is very hard to put out. If there is fuel that will take its fire, it can be used to initiate fire at whatever range you can throw it.

A flare gun has more range than a road flare, allowing you to place a hot, long-burning fire at a distance, if you can hit what you aim at.

MOLOTOV COCKTAILS

A Molotov cocktail can be used to start a fire from a remote location. Like a road flare, its range is determined by its weight and the strength of your arm. If it is used to start a fire where you have already dispensed fuel, it doesn't need to be very big, and it might not even matter whether it breaks.

TORCHES

Like a road flare, a primitive torch can be thrown. Make it by wrapping wick material, such as cloth or absorbent paper, securely around the end of a stick, and saturating the wick with liquid or semi-liquid fuel, such as gasoline or animal fat. Use a stick that is heavy enough to be thrown but not so heavy that you can't throw it very far. If the stick is one you can get splinters from, wrap the end you will grip when you throw it with something like tape, or wear heavy leather gloves.

Use enough fuel that it burns well, and let it get burning well before you toss it.

FIRE ARROWS

These have been used as remote fire-starters since ancient times. They are made by fixing cloth saturated with something like animal fat or pitch to the end of an arrow, and lighting it before the arrow is shot. One or a few arrows by themselves do not usually contain enough fuel to get a fire going, unless the arrow's fire reaches fuel that will take fire easily. Since the majority of residential fires are started by cigarettes, such fuel must be pretty common. As a remote initiator where fuel has already been dispensed, they can be very effective, if you are a good enough shot to hit your fuel.

INCENDIARY BULLETS

Armor-piercing incendiary bullets have been produced in factories to give riflemen a capability of blowing up gas tanks. They are hard bullets containing something like white phosphorous in the base. These bullets can be very effective against tanks containing gasoline; they are far more effective on tanks that are only partially full because of the air/fuel mix in the tank.

To defend against these bullets, most military vehicles burn diesel instead of gasoline; since diesel is far less volatile, they are far less effective against tanks of it.

Military tracer rounds are also hard bullets with a chemical that burns in the base. They might be able to ignite gas fumes etc., but are less likely to than incendiary bullets because they do not carry nearly as much fire.

If you have or might have access to this weapon, study your environment to see what gasoline tanks you could reach and penetrate with a hard bullet; calculate when they and their surroundings will be the most vulnerable, and you will be the least so. The closer you are to the target the more burning phosphorous and bullet energy you will deliver into it (unless the bullet passes all the way through). The further away you are the safer you will be from the blast and fire.

Fire bullets can be used to start pre-set fires as well. Just make sure there is a fuel container that will take and spread fire from the bullet that can be hit and penetrated by it. This might be a liquid fuel vessel, a gas-filled chamber, or something else.

Incendiary and tracer ammunition can be found at some gun stores, though most don't carry it. It is also available from Shomer-Tec (Box 28070 Bellingham, WA 98228. They have a catalog for $3. It might also be found in military stores.

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Notes

Notes

The Black Book of Arson

by

Lyle Whitney

Fire has been a powerful weapon ever since Man first learned to produce and control it. At the beginning of the Second World War it was generally believed that explosive bombs were more destructive than incendiary bombs, but by the end of the war the engineers of its machines had learned that pound for pound, incendiary bombs are several times more destructive than conventional explosive bombs. As materials to make such weapons are commonly available, a powerful weapon is contained in knowing them.

The Black Book of Arson explains in detail how to use fire to its fullest effect. Learn the best ways to make Molotov cocktails, where to set fires for maximum effect, and how to make waterproof igniters from matchbooks and balloons, to be used in timer and boobytrap systems. Learn how to analyze the fuel load of a target, and how to turn gasoline into napalm. Learn to attack with smoke and poison gas as well as heat and flame. Learn to defend yourself and others from fire as well. And there is much more. Arm yourself for survival and freedom.

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